

The Iron Age

A Review of the Hardware and Metal Trades.

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Improved Charging Apparatus for Blast Furnaces.

The introduction of the closed top, or bell and hopper, into the construction of blast furnaces, has done much toward increasing and cheapening the production of iron. It admits of the utilization of a large amount of gases, which were formerly wasted, and places them under the direct control of the furnace manager, who conveys them to the points where their combustion is desired. The bell and hopper arrangement also obviates expensive masonry supporting hot ovens and boilers, or towering stacks, to obtain the required draught.

In the accompanying illustrations we show an improved charging apparatus, invented by Mr. P. L. Weimer, and manufactured by Messrs. Weimer & Birkenbine, blast furnace engineers, of Lebanon, Pa.

The tunnel head of the furnace is fitted with the usual form of bell, hopper and lip-ring, the lower part of the bell and the bottom of the lip-ring being turned off so as to make a tight joint. On top of the hopper is placed an iron cover, provided with three or more openings (the engravings show three openings), which can be closed at will by sliding doors. The rod supporting the bell passes through the top of

dropping the bell a fair approximation of the daily waste of gases from a moderate sized furnace would be from 60,000 to 100,000 cubic feet, a quantity which is surely worth utilizing. This apparatus also obviates the necessary changes in temperature and pressure, which must follow the opening of the full area of the tunnel head every few minutes.

The arrangement of the covering or floor plates is novel; they are cast to fit the shape of the top of the stack with a bevelled segment of a circle taken off at the corners. When laid, these plates are held in position by bevelled washers and counter-sunk screw bolts, which makes a covering free from irregularities, and yet allows sufficient freedom of motion for expansion.

Another peculiarity is the fence. It is composed of cast iron posts, well secured, to which wrought rails are attached by bolts, making a safe but pleasant fence for warm weather, as shown in Fig. 1. When the cold weather sets in, a series of plates can, by loosening the bolts, be inserted between the rails and posts, and made secure, so as to give the proper protection for winter, as shown in Fig. 2. Any part of the fence may be thus protected, and the rest left open.*

A number of iron manufacturers, recognizing the value of the improvements, have

sound of music, and with appropriate gesticulation. In Wynkyn de Worde's "Boke of Keruyng," too, published in 1513, the author tells the carver he must: "Set never on fyse, beest ne towle more than two fyngers and a thombe;" clearly showing that forks were not in use; and adds: "Your knife must be fayre, and your handes must be cleane, and passe not two fyngers and a thombe upon your knyfe."

Yet the fork was employed for certain purposes among our ancestors at least two centuries before this was written. One fork is mentioned in the wardrobe account of Edward I for the year 1297, and Edward II's favorite, Piers Gaveston, had (Foedera, year 1346) "Trois fourches d'argent pur mangier poivres." Le Grand d'Ausy (*Histoire de la Vie Privée des François*, tom. III, page 179) says that forks are enumerated in an inventory of the jewels of Charles V, of France, for 1379, and this is the only instance he mentions during the middle ages.

On Friday night of last week, at the Bethlehem Iron Works, Mr. Wm. Stubblebine, foreman of the merchant mill (a twelve inch train), turned out nineteen and a half tons of finished iron, beside changing rolls, in the space of nine hours, the actual working time being six hours. This night's work is certainly hard to beat, as eighteen tons of finished iron is con-

These pulleys are made in three sizes—1½, 2 and 2½ inches. The cut represents the 2 inch pulley, full size.

The Outlook for Railroads.

A writer in the *National Car Builder* discusses the prospects of a revival of activity in railroad connection in the following sensible manner: It is futile to expect any improvement so long as there is distrust arising from defaults and rumors of foreclosures and sales under the hammer. These are perhaps unavoidable under the circumstances; yet the transfers to new owners by forced sales may prove in the end to be the most effective means of restoring to railroads their former prestige, and make them once more attractive and paying investments. Many well located roads are incomplete, and cannot do the business legitimately within their reach for want of the necessary equipment, terminal facilities, and other working requisites. They cannot borrow the needed capital to make their past outlays available, and also secure the advantages of a prospective development of traffic along their lines. Their creditors refuse to make further contributions, and desperately resolve to pocket their losses by selling their property to the highest bidder. The buyers in such case are apt to

encouragement from the latter is to diminish the chances for the profitable employment of capital in most other directions. Indeed, it is safe to say that if railroads are to be kept under ban another year by hostile legislation, and distrust on the part of those who have hitherto most profited by them, the excessive supply of capital and labor will be such as to create a very anomalous condition of things—a kind of dead-lock very difficult to deal with.

The fact that nearly 2000 miles of new road have been built during the past year is a hopeful augury of the future. Much of this mileage consists of narrow-gauge and other roads of merely local importance, such as feeders and completed connections; but they have evidently not been built with money borrowed on call. The bulk of the work that is likely to be done in the near future, will be the completion of unfinished lines, the supplying of missing links, and the making of such repairs as will render past expenditures remunerative. In many localities years must elapse before the traffic will be equal to the provision already made for it, while there is elsewhere need of still greater facilities than now exist. The low prices of material and labor afford an opportunity for constructing roads cheaply, a circumstance which is not likely to be overlooked by capitalists who desire to change a dead or du-

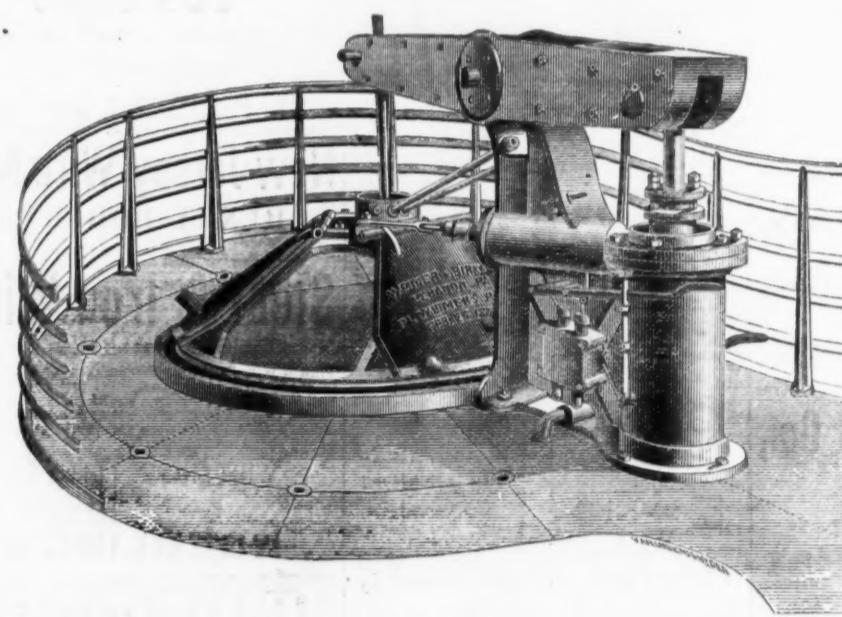


Fig. 1.

WEIMER'S IMPROVED CHARGING APPARATUS FOR BLAST FURNACES.

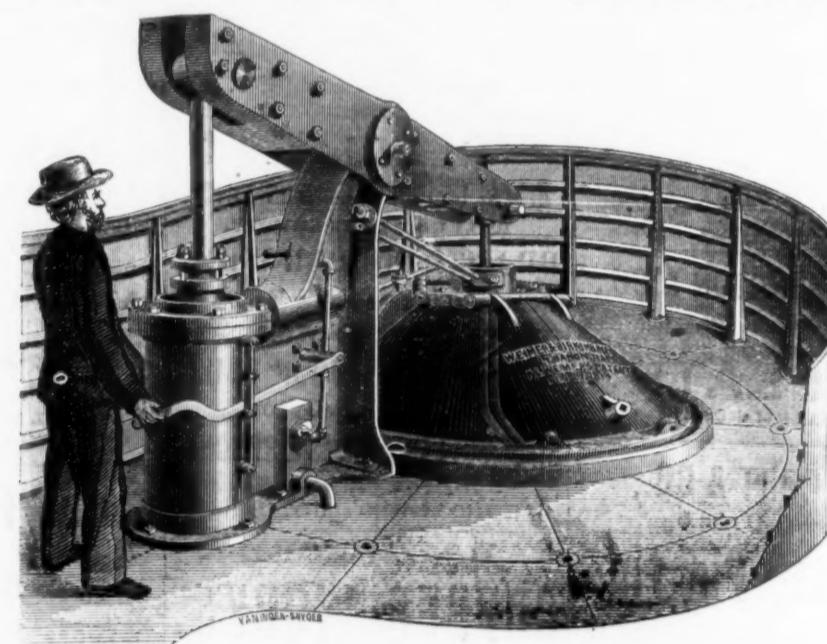


Fig. 2.

the cover, and is attached to one end of a beam, which is supported upon a casting of sufficient strength, combining two cylinders, one horizontal and the other vertical, with their necessary ports, etc. The piston in the horizontal cylinder is connected by means of piston and connecting rods with a revolving plate on top of the cover, to which the doors are attached. These doors are hung on hinges, so that in case of any excessive pressure they will open, or it may at some time be desired to lift one or the other of them. The piston in the vertical cylinder is connected by a piston rod with the end of the beam opposite that to which the bell is attached. Fig. 1 represents the bell closed and the hopper ready for its charge, which is supplied by means of the usual charging barrows dumped through the open doors. When the charge is to be dropped the attendant depresses the left hand lever shown in Fig. 1, which admitting steam into the horizontal cylinder, causes the plate on top of the cover to revolve and carry the doors with it, thus closing the openings. A small safety valve placed on the cylinder prevents risk of damage by too sudden closing. When the doors are closed the right hand lever, Fig. 1, is raised, which, by admitting steam into the vertical cylinder, drops the bell and its charge. By depressing the same lever the bell is raised again to its position, and the valve arrangement is such that the movement is under the easy control of the operator, who can bring the bell to its place as gently as he pleases. The screw on the rod supporting the bell admits of its exact regulation, and the swivels admit of perfectly free motion; the top of the cover acting as a guide. When the bell is in place the left hand lever, Fig. 1, is raised, which causes the doors to open. Fig. 2 is a view of the apparatus with the bell dropped and the doors closed; it also shows the opposite side of the supporting casting. The apparatus can be operated by steam, air or water-power, and can readily be removed in case any repairs are necessary at the tunnel head. Special provisions are made to obviate difficulty when a bell falls into the furnace or accidents occur. The only gas which escapes is, obviously, so much as can be contained within the space between the bell and the cover, a very small amount. With the usual mode of

adopted them; and we are convinced that the top fillers will be well pleased to be relieved from the labor of manipulating the bell, and be glad to be able to drop the charge without having to retire behind a screen to protect themselves from the intense heat. They will also recognize the value of smooth top covering plates, and a fence which will be alike a protection against both cold and heat.

A Fork of the Bronze Age.

The *Pittsfield Gazette* says: A bronze fork with two prongs, discovered by Mr. George Smith, in the mound of Konyunjik, supplies food for some reflection. If it really is a *bona fide* fork, it is one of the most singular and remarkable relics of antiquity. That "fingers were made before forks" is a proverb the truth of which no one, we presume, is inclined to dispute. But we are apt to forget how very long the people of the west, at any rate, were destitute of forks; and if Mr. George Smith's fork is a fork, as he evidently supposes it to be, another and a very important addition will have been made to the claims of Asia to early superiority over Europe. Neither the Greeks nor the Romans knew anything of forks for eating, although that they had pitchforks from time immemorial, and did not take a hint from them speaks little for their analogical ingenuity. And, notwithstanding that forks were known as rare and exceptional instruments in the middle ages, they were not used either by carvers or eaters of meat even so late as the early part of the sixteenth century among the most advanced in European nations. The Greeks had knives for carving. But when they fed themselves with solid food they did it with their fingers, which they afterward wiped on pieces of bread. When they took soup they used either a spoon or a bit of bread hollowed out. So likewise the Romans fed themselves with their fingers when they ate solid food, and liquid food they took with a spoon (*cochlear*). But they had no forks, although they cultivated carving as an art with considerable assiduity.

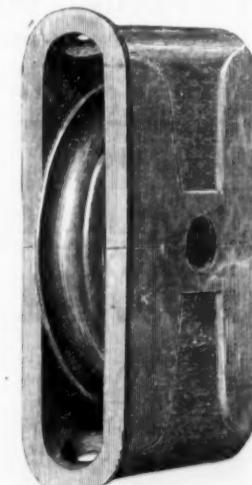
The carver, scisor or strutor was a person guided by rules, who performed his task to the best of his ability.

*Owing to an error in drawing, the cut Fig. 2 does not properly represent the position of the sheets in the closed fence.

sidered a day's work. Beside, four and five men are usually employed at the rolls, while this work was accomplished by three men. This same mill turned out eighteen tons of finished iron every night that week.

Clark's Improved Axle Pulley.

In the accompanying illustration is shown a new style of axle pulley, manufactured by Clark & Co., Buffalo, N. Y., and patented July 15th, 1873. It is constructed without the ordinary face plate. This pulley is not in loose pieces, like others of its class, but is so con-



structed as to firmly hold together and inclose the wheel and axle. The case cannot be wedged apart in fastening it into the frame, and is intended for a mortise when the ends are bored. The facility with which this pulley can be set in the frame is one of its most important features, and should commend it to the favorable consideration of the trade. No screws are used, but simply small nails driven through each end to secure it in position. The illustration shows the pulley made with round ends to fit the mortise as made by the bit. They are also made with square ends to fit a square end mortise.

drive a good bargain, and come into possession with an ample margin of profit and a greatly reduced capital account, ready for a good start when the tide turns.

There are also some roads that should never have been projected, much less built, in whole or in part—visionary and speculative enterprises, starting from nowhere and terminating at any point where the funds gave out. If sold under the hammer, at whatever sacrifice, they would prove as much of a dead weight to the buyers as they were to the original owners. They are the diseased members of the system, and when lopped off the better class of roads are the gainers. Skillful surgery, as well as careful nursing, is necessary to restore the old relations between railroads and capital. The holders of stock and bond securities will in future require some rational assurance of honestly earned interest and dividends; there must be more conservative and less profligate management; fewer inside rings and kindred devices for absorbing resources and earnings. This may seem somewhat rigorous and exacting, but there is evidently no help for it. It will not do to assume that railroad property is to become permanently unproductive, and so repel capital instead of attracting it. The system is too gigantic, too intimately interwoven with the structure and very existence of modern society; it is too great a consumer of the products of labor, and too indispensable to every branch and ramification of industry to be classed among the bubbles that float for a time and then disappear. A railroad, once constructed, is a fixture, so far at least as grading, bridging, tunneling, etc., are concerned, and the capital represented thereby is anchored sure and fast for better or worse.

Now it seems to us that capitalists, as soon as their intelligence begins to get the better of their caution, will see the situation in its proper light; and recognizing the fact that railroads are certain to be constructed and used wherever the need exists, a right discrimination will be made between those which, from their location and management, promise to be ultimately remunerative and those which do not. It must be easy to see how largely dependent are manufacturing and other enterprises upon the prosperity of railroads, and that to withhold

bius investment into a profitable one. The renewals of rails and rolling stock have for a year and a half been restricted to the smallest practicable limit, and further and heavier purchases can not much longer be deferred. This we know is a threadbare argument, but it is a good one; for we maintain that any improvement in the present condition of things must begin where the crash began; that is, with the railroads, which are the basic and mainspring of our industrial prosperity and progress.

They must also be sustained by a more tolerant and liberal attitude on the part of capitalists, and this again must be met by a more conservative and economical management of the roads. In this way, and in no other, will the machinery of trade be set in motion, and the vast capital invested in our iron manufactories be vitalized and made productive. General business, if no disturbing element is interposed by unwise legislation, will slowly recuperate, and the exchanges of products will increase the earnings and improve the financial condition of the roads and generally.

Lined Iron Pipes.—British patents have been issued for a process of lining or coating wrought or cast iron pipes with lead, tin, or other suitable metal or alloy, or gutta-percha, or a mixture of gutta-percha and other material suitable for preserving and increasing the durability of the pipe and enabling it to withstand, when laid beneath the surface of the ground or otherwise, the action of any fluid, liquid or other matter to which it may be heated or not, an iron or other suitable core or spindle, leaving a space between it and the pipe corresponding to the thickness of the intended lining. The lead, tin, or other material is then melted and forced in by hydraulic or other pressure between the tube and the core. When the lining has cooled sufficiently, the core is removed, and the operation repeated for an additional length of the pipe, where the pipe is too long to admit of the whole being completed in one operation. For coating the pipe, a mold or barrel is passed over the pipe, sufficient space being left between it and the pipe to admit of the desired thickness of coating being applied, the operation of coating being similar to that of lining.

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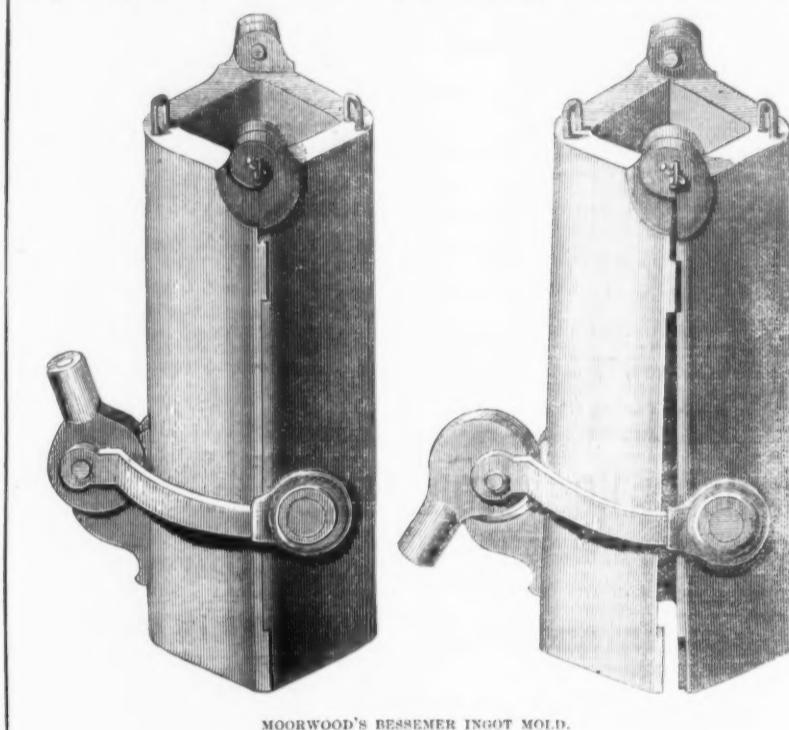
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Moorwood's Bessemer Ingot Mold.

Bessemer steel is usually cast in molds, either octagonal or square, the interior of which is cone shaped, to facilitate the expulsion of the ingot after casting, as the molds have hitherto usually been made in one piece. This kind of mold, however, has been found to have many objections. It does not allow for expansion, and, being perfectly rigid during casting, unless made of the best iron, is very liable to break. The ingots from this kind of mold are taper in form, which is objectionable for cogging or hammering. In spite of the taper form of the ingot, it frequently sticks fast in the mold, which has to be broken to release it, perhaps the first time of using. Various plans have been tried to work Bessemer ingot molds in two parts, but from their size and weight, it has always been very difficult to fasten the two halves together when heated by a previous cast. It is chiefly in a modification of the latter arrangement that the excellency of Moorwood's molds consists. The two parts of these molds, as will be seen by a reference to the engravings, are hinged at one end, and also at the sides, being securely held together during the casting

'The facts are these,' it says, 'the Principe Amedeo was to go to Misenum for powder and munitions of war, and a little trial of her was made. Four boilers (she has six) were used, and barely eight miles were run with 45 revolutions of the machinery and a pressure of 16 lbs. On returning, six boilers were used, with a pressure of 22 lbs, but with 48 revolutions the Amedeo only made 8 1/2 miles. The machinery acted well and is equal to that of the Venezia, but can never give the same result. It is the fault of the ship, or rather of the modifications which have been made of her original design. The Venezia, with 48 revolutions, makes ten miles, and with 65 revolutions, 13 miles; whereas the Amedeo with 65 revolutions, can never make more than ten miles. The plan of this vessel and that of the Amedeo are the same, but in the case of the latter it has undergone so many changes that it can never under any circumstances respond to the estimate formed of it. According to original design, the Principe Amedeo was intended to carry an armor of 12 centimeters of thickness, and cannon, instead of being 12 tons, are from 18 to 25 tons—that is to say, six of 18 tons, and one of 25



MOORWOOD'S BESSEMER INGOT MOLD.

process by an eccentric lever working on a stud fixed on two arms. These arms are attached to lugs, or projections, on one of the halves of the mold, and by lifting the lever the fastener closes it and holds it securely in position. Again, the lifting lugs being fixed at the hinged end, when the ingot has been cast and the lever fastener moved so as to leave the mold free to open, it is only necessary to raise it, when the dragging motion of the crane will separate the halves, and the ingot will drop out. Other arrangements of the hinges may be adopted without detracting from the advantages of the molds, but, in most cases, probably, the plan just described will be found most convenient. An incidental advantage of the new molds over those hitherto constructed is the power of gradual expansion afforded by them which may be put in action as soon as the metal is set. Another and more important matter is, that the ingot comes out perfectly parallel. The improved mold is also durable, which is a matter of considerable importance in large works; and when only one-half is damaged, it can, of course, be renewed separately. The lever is very easy to work; it may, indeed, be managed by a boy. Although we have described this neat and useful invention as connected with the manufacture of Bessemer steel, it will be seen that it may not less conveniently be applied to the casting of ingots from any other metal.

An Italian Iron-Clad.

The London *Times*' Naples correspondent writes under date Feb. 6: "Not many days have elapsed since the iron-clad war frigate, the Principe Amedeo, made her trial trip to Misenum. Since then considerable discussion has arisen as regards her capabilities, and even the most sanguine await the result of other trials with anxiety. The Principe Amedeo, which was built at Castellamare, was launched three years ago, and was regarded as one of the crack ships of the Italian Navy. Before leaving for Spezia to be completed she had to go to Misenum to take in her powder and munitions of war, and it was thought well to make a trial of her capabilities on this short trip. The *Gazzetta di Napoli* reported that she did not obey her helm, that her immersion was too great, and that her speed was scarcely eight miles an hour. Such a statement deeply affected national pride, the more so as she was constructed at Castellamare, the dockyard of Naples, and was fitted with machinery from Pietrasa. Several other journals entered the field in opposition, as it is suggested, by official insinuation. The *Puglia* declared the machine to be satisfactory, but as the safety valves were imperfect it was impossible to put on the pressure of which it was capable; it confesses, too, that the immersion was greater than that which was estimated; also, that her speed was less than that of the Venezia, which was built in England, but attributes it to the dirty condition of her keel, which has not been cleaned since she was launched three years ago. The *Gazzetta di Napoli* and the *Piccolo* both adopt the same apologetic tone, yet are convinced that on leaving Spezia the Amedeo will make 12 miles an hour. The *Gazzetta di Napoli*, on its statement being impugned, then enters on its defense.

The evolution of the gas from gray iron is small; the gas consists chiefly of hydrocarbons or carbon iron oxide. From white iron more gas is evolved, together with little particles of iron, which are oxidized in the air. Spiegelstein evolves a peculiar white fuming gas, which contains silica, and is probably silicon fluoride.

The author thinks that the poorer an iron is in combined carbon, the more readily does it absorb gases containing carbon, while the richer it is in carbon the more readily does it dissolve gases containing hydrogen. The primary cause of the evolution of those gases which have been dissolved in the furnace he traces to the diminished pressure under which the iron exists, as compared with the pressure in the furnace.

2. By the action of the air, the surface of the molten iron becomes oxidized. In iron containing much carbon, the oxygen is transferred from the air by means of the metallic surface to the carbon, which it oxidizes to carbon dioxide, which again bubbles up through the molten mass; hence it is in such froth that we find the greatest amount of blisters on the surface after cooling. White iron shows fewer of these, and spiegelstein solidifies with a smooth surface.

3. As the mold into which the molten iron is run always contains water, this water, if vaporized by contact with the liquid iron, the steam thus generated is partly given off as gas, and partly decomposed, hydrogen being evolved and iron oxide being formed. Again, if the iron contains sulphur, this, by reacting on the steam, will form sulphurized hydrogen, which is often formed in the cooled iron.—*A. Ledebur*.

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San Francisco, Cal.

Milwaukee, Wis.

Louisville, Ky.

St. Louis, Mo.

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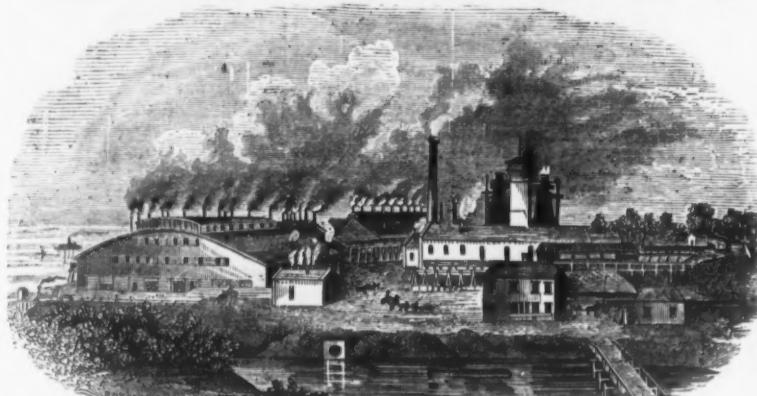
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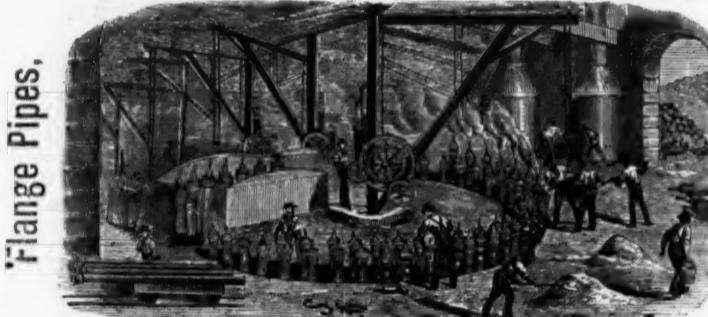
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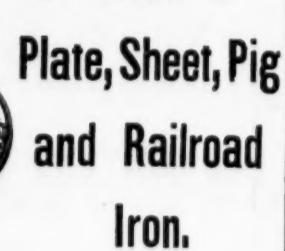
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The Vulcan Iron Works, at Carondelet, seven miles below St. Louis, on the Mississippi River, is an establishment which does credit to Western enterprise. The following description will be read with interest: The blast furnaces of the company are three in number, all large. No. 1 is 60 feet high and 14 feet boshes, with closed top, and has a capacity of about from 13,000 to 15,000 tons per annum. No. 2 is 65 feet high with 15 feet boshes, also closed top, and similar capacity to No. 1. The casting house for these two furnaces are on the west side, and is 90x100 feet. No. 3 furnace has not been finished, but is looked upon as a model furnace; it is 65 feet high with 16 feet boshes, with a capacity of 15,000 tons per annum, and certainly it has not many competitors.

The casting house is 110x50 feet. The stock house is of frame 600 feet long, 130 feet deep and 60 feet high. Two railroad tracks run into and through the stock-house—one from the Iron Mountain Railroad and the other from the Carondelet branch of the Missouri Pacific. They are used for the transportation of iron, iron ore and rails. Most of the coke is shipped direct from Pittsburgh by rail to East St. Louis and the new station opposite Carondelet, Pittsburgh Landing, and is brought to this shore in the same cars on barges. The coke is then put into small cars and pulled up by an engine. The Big Muddy coal is shipped from Grand Tower direct to the wharf of the works and hauled in the same way. The limestone quarry is situated near the works. There are steam elevators to all the furnace tops, and three large brick hot blasts which are kept up to a temperature of from 800 to 900 degrees. There are 18 steam boilers in batteries of three each; these boilers are heated by waste gas. The engine house is 80x60 feet and 60 feet high, and is very solid, massive building. The blowing engine for these furnaces is one of Totten's, of Pittsburgh, largest. It is a vertical, low pressure, condensing engine of immense power, but runs with only 20 to 30 lbs. pressure. It is 47 feet high, blowing cylinders 9x9 feet, steam cylinders 60 inches by 9 feet. The two fly-wheels weigh over 30 tons each, and everything massive in proportion, and it is a model of mechanical skill. There are large ore crushers driven by powerful engines; all the large pieces of ore are roasted before being crushed. The Vulcan Iron Co. use only Iron Mountain ore, this being blue specular and red hematite from the Southwest. Their coal is brought from Gartside's mine, some Indians block coal and coke from Connellsburg, Pa.

This is something to be proud of, and something which will sustain pride without boasting. The ore may not be worth more than four millions of dollars on the docks at Cleveland, but a few such drops makes very valuable the entire contents of a bucket.

THE COAL TRADE.
The sources of coal supply for Cleveland are the Cleveland, Columbus, Cincinnati & Indianapolis Railroad, from Columbus and the Tuscarawas districts; the Atlantic & Great Western Railroad, from Youngstown, Girard, Niles, Leetonia, New Lisbon, Dennison and Silver Creek; the Cleveland & Pittsburgh Railroad, from Pittsburgh, Steubenville, and points below; Enon Valley and New Galilee on the Fort Wayne route, the Massillon region; Mineral Point, over the Tuscarawas branch; Hammondsburg, Yellow Creek and Salineville; and by the Ohio Canal from various points on that line.

The following exhibits the amount of coal received in Cleveland from the sources mentioned during the year 1874:

C. C. & I. Railroad.....	102,210
Cleveland & Pittsburgh Railroad.....	239,908
Atlantic & Great Western.....	487,130
"	"anth. cte." 23,179
Ohio Canal.....	142,820

Total net tons..... 1,295,277

Estimating this fuel to be worth \$5 per ton on the docks at Cleveland, we have a total valuation of \$6,476,385—another valuable drop in the bucket. It might at first seem as though the value of the iron ore would exceed that of the coal, but a thought will show that whilst, on the one hand, Cleveland distributes coal to all the Western lake ports, reaching, to a greater or less extent, over six States and a portion of Canada, and is a large consumer herself—on the other hand, her ore trade is confined to home consumption, the Mahoning and Shenango regions and Pittsburgh.

But thirteen millions of dollars per annum, realized from but two items of trade, is a result of the most gratifying character, and more particularly, when these two items place Cleveland as the leading city of the lakes in these items of commerce.

The *Moniteur* gives the following interesting statistics respecting the wages earned by the different classes of artisans in France. It states that the average daily wages obtained by those employed in the sixty-two trades recognized by the state in 1853 was 1.59f. In 1871 the daily wages averaged 2.65f., or an increase of 40 per cent. Workmen boarded by their master are paid about half less, but except in the country a workman is seldom boarded by his employer, and these statistics do not apply to country workmen. Of all trades, the lowest wages are those of the weaver, who earns only 1.94f.; next come the pastry cook, who is paid on the average only 2.31f.; the shoemaker, 2.34f.; and the rope-maker, 2.36f. The highest wages fall to the lot of the ornamental sculptor, who earns 4.50f.; the watch maker, 3.43f.; the metal-turner, 3.47f.; the stonecutter, 3.43f.; and the jeweler, 3.58f. The class of workmen whose wages have increased the most since 1853 are the pastrycooks, whose earnings have only risen 17 per cent, whilst those of the bakers, on the other hand, have increased 54 per cent. The trades that have made the greatest progress are barbers and sawyers, and their wages have augmented 65 per cent. The average wages of workmen in all branches of trade, taken together, is 2.90f., and those of women 1.29f. Lace-makers earn 1.71f.; artificial flower makers, 1.70f., which trades pay the highest wages to female workers. The increase in women's wages during the above-mentioned period has been 35 per cent. In Paris wages greatly exceed the above-mentioned averages; there ornamental sculptors earn 7f. per day; watchmakers, 4f.; jewelers, 6f.; metal-turners, 6f.; stonecutters, 6f.; and rope-makers, 4f. The average wages of the Parisian workman is 4.99f., and those of workwomen, 2.75f.



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The Triangular Wire Ring, manufactured only by us, is the only wire ring that can be inserted in the hog's nose with one grip on the Ringer, and is the only ring that will remain in a hog's nose, as it fits close, will not turn in for the joint to irritate the nose, is not liable to be torn out, and heals quickly.

No puncturing of the nose required to insert our ring.



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All Nicholson Files are cut with the Patent Increment Cut, an invention owned and controlled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly expanding or increasing in size and space from the point, thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at least) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will not be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of Increment Cut File, which possesses all the advantages of hand cut work, and the accuracy and uniformity of machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

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Price: Largest size \$30 per doz., and upwards, according to size of spaces.

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Hog Holder, 75c. each.
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Rings per box (100) coppered wire	50
" per doz. boxes (1200) " 3.00	60
" per box (100) tinned wire	60
" per doz. boxes (1200) tinned wire	4.00
Tongs or Holders, retail	1.25
" per doz.	9.00

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In the face of strong prejudice against American files, this brand has earned a reputation second to none. The trade in all sections testify to their excellence. We confidently offer these files as superior in every respect and cheaper than any first-class file in the market. A trial will confirm their reputation.

MINOT & CO., 239 Franklin St., Boston, New England Agents.

McKINNEY MFG. CO., Hamilton, O.

Wrought Butts,

Strap & T Hinges.

Send for special discount sheets.

"CHAMPION" Hog Ringer and Rings.

The only Ring invented that will effectively prevent Hogs from Rooting.

Being a Double Ring it is equal to two or three of any other Ring. Having no sharp points in the flesh, it does not cause irritation or soreness as in other Rings. The smooth part of the wire being in the nose, it heels rapidly. One of our rings being equal to two or three of any other ring, makes this ring cheaper than the cheapest ring in the market. Time and money saved in using the Champion Hog Ringer. One operation and the work is done.

Price of Hog Ringer, 75c. each.

Coppered Hog Rings, 50c. per 100.

Price of Tinned Hog Rings, 60c. per 100.

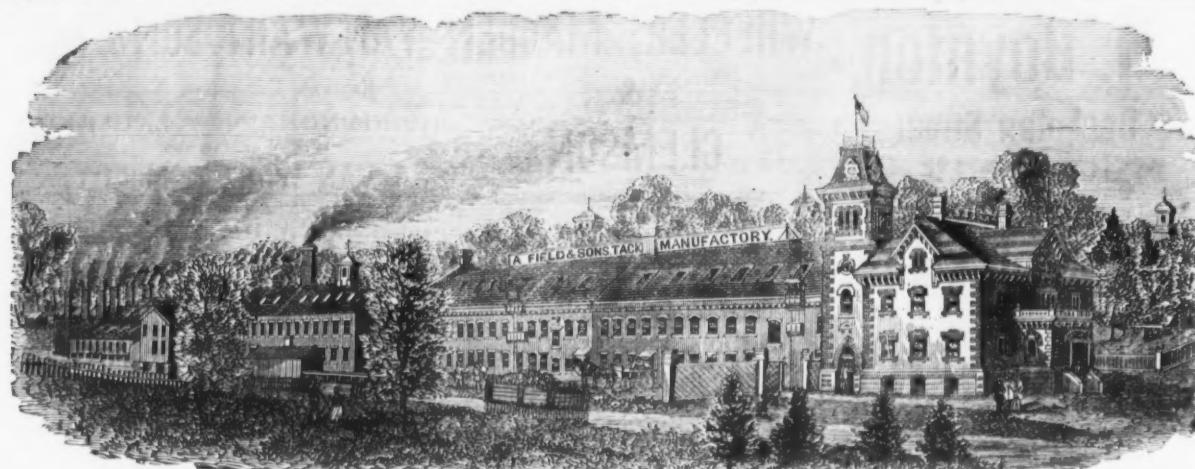
Hog Holder, 75c. each.

Discount to the trade.

CHAMBERS & QUINLAN, Exclusive Manufacturers,

DECATUR, ILLINOIS.

Original Manufacturers of Tinned Rings.



A. FIELD & SONS, TAUNTON, MASS., Manufacturers of Copper and Iron Tacks, Tinned Tacks,

SUPERIOR SWEDES IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.

American and Swedes Iron Shoe Nails,

Zinc and teal Shoe Nails, Carpet, Brush and Cimp Tacks, Common and Paten Brads, Finishing Nails

Annealed Trunk and Clout Nails, Hob and Hungarian Nails,

Copper and Iron Boat Nails, Paten Copper Plated Tacks and Nails

Fine Two Penny and Three Penny Nails, Channel, Cigar Box and Chair Nails, Leathered Carpet Tacks, Glaziers' Points, etc., etc.

OFFICES AND FACTORIES AT TAUNTON, MASS.

WAREHOUSE AT 35 CHAMBERS STREET, NEW YORK, where may be found a full assortment of Tacks, Brads, &c. for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above named goods made from samples, to order.

OTIS PASSENGER AND FREIGHT ELEVATORS

FOR HOTELS, OFFICE BUILDINGS, STORES,
WAREHOUSES, FACTORIES, MINES,
BLAST FURNACES, &c.

OTIS BROTHERS & CO.
SOLE MANUFACTURERS,
348 Broadway, New York.

EMPIRE PORTABLE FORGES

NO BELTS, BELLOWS OR CRANKS.

The Best Made.

Send for Catalogue to the

Empire Portable Forge Co., Troy, N. Y.

THE CANADIAN BANK OF COMMERCE.

Capital - - \$6,000,000, Gold.
Surplus - - \$1,800,000, Gold.

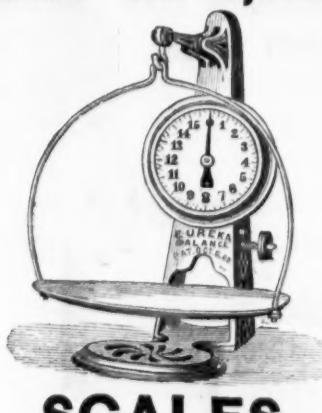
The New York Agency, 50 Wall St.,
Buys and sells Sterling Exchange, makes Cable
Transfers, grants Commercial Credits, and transacts
other Banking Business.

J. G. HARPER, Agents.
J. H. GOAFBY, Agents.

HOISTING Machinery

Mfd. by
CRANE BROS.
MFG. CO.,
Chicago.

Eureka Self-adjusting



SCALES.

Have a patented attachment for ascertaining the *tare* of a dish or other receptacle used in weighing without the use of weights or loss of time.

Manufactured only by

JOHN CHATILLON & SONS,
91 & 93 Cliff St., N. Y.

CROCKER BROTHERS, 32 Cliff Street, N. Y.

METALS.

Anthracite Pig Irons,

COLD AND WARM BLAST CHARCOAL IRONS,

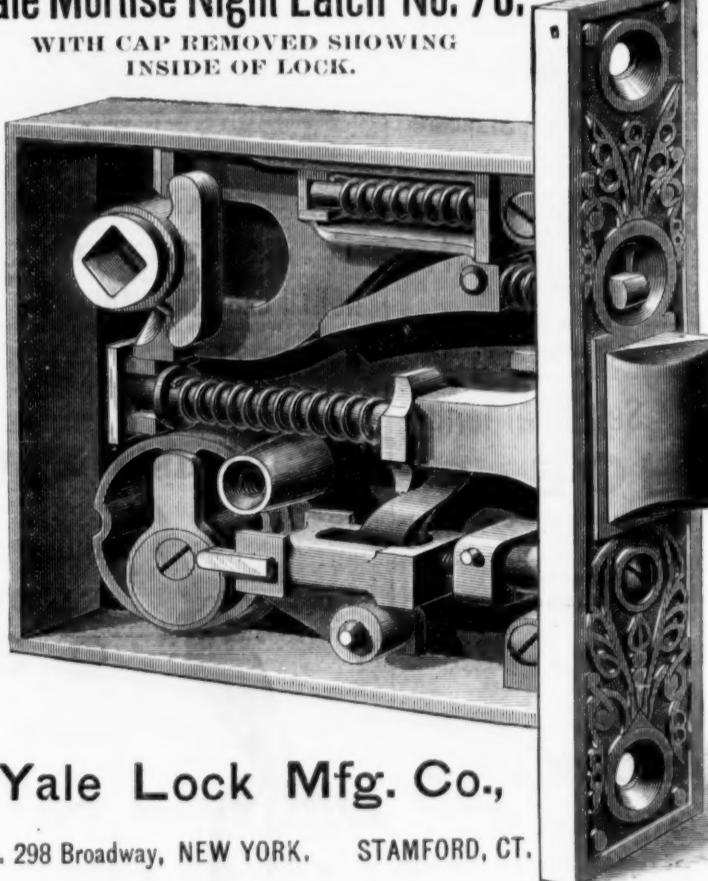
American and English Bessemer Irons, Iron Ores.

COPPER, TIN, &c.

Advances made on Merchandise.

Yale Mortise Night Latch No. 70.

WITH CAP REMOVED SHOWING
INSIDE OF LOCK.



Yale Lock Mfg. Co.,

No. 298 Broadway, NEW YORK. STAMFORD, CT.

Empire.

THE Empire and Monitor Lawn Mowers

Have been before the public several
years, and have won universal satis-
faction. Therefore it is not necessary
to make lengthy comments, only to say
they are the lightest and strongest
mowers in the market; also, for sim-
plicity of construction, durability, and
lightness of draft, they are acknowl-
edged to be superior to any machines
made. They are sold at *Panic* prices.

MONITOR and EMPIRE, 15 in. cut, \$20.00

MONITOR, 10 in. cut, \$15.00

Agents wanted everywhere.

MANUFACTURED BY

BARLOW & WALKER, Sing Sing, N. Y.



BUSINESS ITEMS.

NEW YORK.

The Albany & Rensselaer Iron and Steel Company has just been organized at Troy, and takes the place of the firm of John A. Griswold & Co., which has been dissolved. The new enterprise goes at once into full operation, and continues the business of the former firm. It also includes the Albany Iron Works, lately owned by Erastus Corning & Co. Of the new corporation Erastus Corning is president; Chester Griswold, vice-president; James E. Walker, general manager, and Selden E. Marvin, secretary and treasurer. This corporation embraces probably a larger tonnage than any other manufacturing organization in the United States, each of the consolidated firms having owned extensive works.

It may be dull times among manufacturers generally, but the Island Works, at Seneca Falls, are an exception. They keep up their full force of workmen. They make steam fire engines of superior excellence, and have recently shipped Sibley steamers and hose to Wilmington, N. C., Carthage, N. Y., Mobile, Ala., Stratford, Canada, Kenosha, Wis., and to Austin, Texas. A large number of steamers are now being built under contract at the Island Works, and orders still come in. The proprietors employ a large force of workmen, many of whom work over-time.

The Schenectady Locomotive Works have 150 men employed, but the force is to be increased. Work has been begun on an order for 12 heavy ten-wheeled engines for the Central Pacific.

The Buffalo Iron and Nail Company's furnace, at Buffalo, which was blown out last month, after a successful run of fifty-one months, will be put in order for blowing in at once. The company consume the iron produced at their furnace in their rolling mill and factories.

NEW JERSEY.

The Phillipsburg Manufacturing Company is to be dissolved, and the works at Phillipsburg sold to a new company which will continue the manufacture of bridges and wrought iron work on a larger scale.

The owners of the Jersey City Steel Works have bought the old rolling mill property at Elizabethport, and propose erecting large buildings there, to which the steel works will be removed.

PENNSYLVANIA.

Perrotet & Hoyt, Columbia, were in constant operation through the winter, principally on furnace and rolling mill work, gas works, Siemens' gas producers, etc., together with some steam engine and other machinery.

Richie Bros., proprietors of Philadelphia Scale and Testing Machine Works, have recently furnished the Cambria Iron Co., Johnstown, with a testing machine of 150,000 lbs. capacity, for testing the tensile and crushing strains of iron &c., of almost any length.

The Gibbs & Sterrett Manufacturing Company, at Corry, are now employing about 250 men, and will no doubt increase their force to 300 soon. Their works have the appearance of a huge bee hive. A short time ago they contracted with the State Grange, of Missouri, for 500 reapers for the coming season, and last week, Mr. Clark, Master of the State Grange, of Oregon, who had been in attendance at the session of the National Grange, at Charleston, South Carolina, returned this way, and was so well pleased with the reapers that he made arrangements for 100 to be sent to the Pacific coast.—*Ex.*

The Pittsburgh and McKeesport Car Company has orders for a narrow gauge engine and a number of cars for the Ohio and Toledo Road, beside some engines for shifting at furnaces.

Large orders are on hand at the Susquehanna Iron Company's Rolling Mill, Columbia, and the mill is now running full double turn.

There are good prospects that the Watson town Car Works will soon be in operation.

Stouffer, Porter & Co., of Connellsville, manufacture frogs, switches, bridges and pit cars, besides tools and general machine work. Their works have run steadily during the past year, and have turned out a large quantity of castings for the Cumberland and Pennsylvania Road, beside the other work.

The New Brighton *News* says: The old Anderson foundry, of Rochester, has been put in operation through the agency of the Cooperative Foundry, at Beaver Falls. G. Y. Marks, Esq., is the principal manager of the newly started works, and enters upon his work determined to make it a success. Judging from the former success of the company, we have no doubt they will succeed well in the foundry at Rochester.

It is stated that in case the Allegheny Valley Rolling Mill, at Kittanning, is not rented to a New York firm, the proprietors intend running it themselves as soon as it can be put in proper repair.

The Lemont Furnace Company, says the Uniontown *Genius of Liberty*, has engaged a first-class furnace man to superintend the erection of the new furnace, and he will commence operations as soon as the weather will permit. There is a very strong probability that a new furnace will also be commenced before long at Mt. Braddock, by Beeson, Hogsett, Watt & Co. The parties interested have had the matter under discussion, and we understand it is the determination to push it to completion at an early date.

Cole & Heilman's Boiler Works, at Allentown, which had no iron for some days, and consequently stopped work, resumed full operations on Monday morning.

The orders for blowing out the blast furnaces of the Phoenix Iron Company, at Phoenixville, have been countermanded, and they will continue in operation.

Six hundred men are working on full time

Erie shops at the Susquehanna depot. The shops are filled with disabled locomotives and broken down machinery.

Glen Rolling Mill, at Allentown, is to be started on the co-operative plan.

MASSACHUSETTS.

Hawkins & Burrall, of Springfield, have just completed a new iron bridge of two spans, 104 feet each, for the Cheshire Railroad, at Troy, N. H.

In addition to the other work on hand, the Wason Manufacturing Company, at Springfield, is building some passenger coaches for the Illinois Midland Road.

VERMONT.

The rolling mill of the St. Albans Iron and Steel Company, at St. Albans, resumed work March 2, after a stoppage of four months. Six heating furnaces are in blast. The puddling mill is running single turn with all the furnaces.

MAINE.

The Portland Rolling Mills have started up after remaining idle about a month while undergoing repairs. The mills turned out 14,650 tons of rails last year.

The Knowlton Platform and Car Coupling Company has been organized at Rockland, for the purpose of manufacturing platforms and car couplings, under the patents issued to C. H. Knowlton, Nov. 26, 1872, and April 1, 1873. Its capital stock is \$50,000.

OHIO.

The North Toledo Engine Company, of Toledo (formerly the Perkins Engine Company, of Fort Wayne), occupy two substantial brick buildings, one of which is 120 feet long by 40 broad, and the other 83 feet long by 40 broad. These are fitted up for the foundry, machine shops, forges, pattern room, &c. In addition to this, the company has a dock 320 feet long by 30 broad, extending into the river. A switch connects the works with the Canada Southern Railroad. The company has a capital of \$35,000, and the capacity of the works is one six-horse engine per day.

INDIANA.

The firms of Scoville & Chase, and Scoville, Chase & Smith, of Cleveland Tube Works, have recently dissolved. Mr. Scoville will continue the manufacture of wrought iron pipe, boiler tubes and steam heating apparatus, and Mr. Smith will continue to manufacture steam radiators, and to contract for steam heating apparatus, and the ventilating of buildings, for which he will furnish plans on application.

INDIANA.

Both of the rolling mills at Indianapolis have resumed operations, after being closed for several weeks for want of coal. These mills employ 600 men. They have orders ahead for more work than they can do, and will continue to operate unless compelled to suspend again for the above reason.

The Southwestern Car Works, at Jeffersville, has taken a contract for 100 freight cars for the Terre Haute and Indianapolis road.

KENTUCKY.

The Kentucky Rolling Mill, at Louisville, has been improved by the addition of new machinery for the manufacture of light T rails and street rails, and its trade therein is constantly increasing.

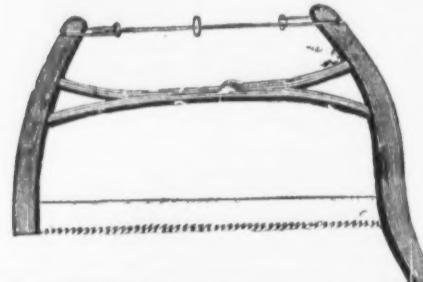
CALIFORNIA.

The wire rope works of A. S. Hallidie & Co., San Francisco, have been entirely remodeled during the past year, at an outlay of \$50,000. New and ingenious machinery and labor saving apparatus have been put in, and the capacity of the works trebled. Some of the ropes made at these works are of immense size. The steel rope used on the Clay Street Hill Railroad, 7000 feet in length, 3 inches circumference, was made in one piece, and also a steel rope for one of the Virginia mines, 2400 feet long, 6 1/4 inches circumference. There are 30 men employed in the establishment, and about 30,000 lbs. of refined steel and other ropes are turned out for mining purposes per month. Galvanized wire rope, for ship rigging, is an important part of this industry. The ropes made here are in very much favor with the riggers, and are sold at half the cost of hemp rope. Within the past three years these works have turned out some submarine telegraph cables, from one to six miles in length. This also promises to be a growing branch of industry. The business extends to Mexico, Japan, British Columbia, and as far east as Colorado.

The Labor Troubles in Pittsburgh.—We take the following from the Pittsburgh *Commercial*, of the 11th inst.: One of the results of the meeting of the rollers and heaters, Tuesday, was developed yesterday morning at the works of the Pittsburgh Bolt Company, all the men who ceased work when the colored bolters were introduced at the works resuming operations. The mills are now running with their full complement of operatives. At the meeting, Tuesday, it was argued that so far as the bolters were concerned, the working of muck iron produced by negro bolters was no worse than the working of that brought from the East and elsewhere. Since the beginning of the lock-out the bolters have used all the influence they possessed to induce the rollers and heaters to join them in resisting the demands of the iron masters for a reduction in their (the bolters') wages. At the meetings of the rollers and heaters the subject has been thoroughly discussed, and the sentiment among this class of iron workers has all along been decidedly against any interference in the lock-out. It was argued by them that so long as their employers asked no reduction of their wages it was not their business to inquire where the muck iron came from. The leading bolters, we learn, were not opposed to the resumption by the men at the bolt works, "because," said they, "if the rollers and heaters at the other mills decline to aid us, by striking against the use of Eastern muck iron, it would not be fair to ask the men at the bolt works to strike against the use of muck iron produced by the negroes." It may be safely said, therefore, that there will be no further interference with those men by the bolters.

GEORGE GUEUTAL & SON,
39 West 4th St., New York.
IMPORTER OF
Wood Screws, Steel in Sheets,
BAND SAWS, TOOLS FOR BRAZING, &c.
Bed Screws, Pin Hinges, and Wire Nails a Specialty.

H. W. PEACE,
MANUFACTURER OF
Saws of all kinds.
FACTORY, WILLIAMSBURGH, N. Y.



Elliptic Forked Saw Frame.
Patented June 28th, 1870.

The annexed engraving represents my ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Blade being all in one piece, without any center bolt, secures for the Frame great strength and durability. These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

HARVEY W. PEACE,
Sole Proprietor & Manufacturer,
VULCAN SAW WORKS,
WILLIAMSBURGH, N. Y.

**THE SILVER STEEL
DIAMOND CROSS-CUT SAW.**

\$1.50 Per Foot.



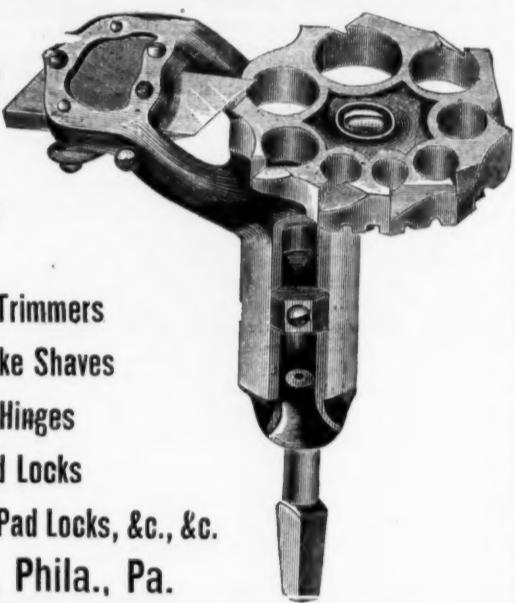
Patent Secured

THIS new Saw, which is destined to take the place of all Cross-cut Saws in point of SPEED AND EASE, is manufactured by E. C. ATKINS & CO., Indianapolis, Ind., who are the SOLE MANUFACTURERS FOR THE UNITED STATES. So confident are we that this is the best Cross-cut Saw in the market that we CHALLENGE THE E. C. ATKINS & CO. Saw Manufacturers and Repairers, Indianapolis, Ind.

**Lloyd, Supplee & Walton,
HARDWARE FACTORS.**

MANUFACTURERS OF

**Bonney's Hollow
AUGERS.**



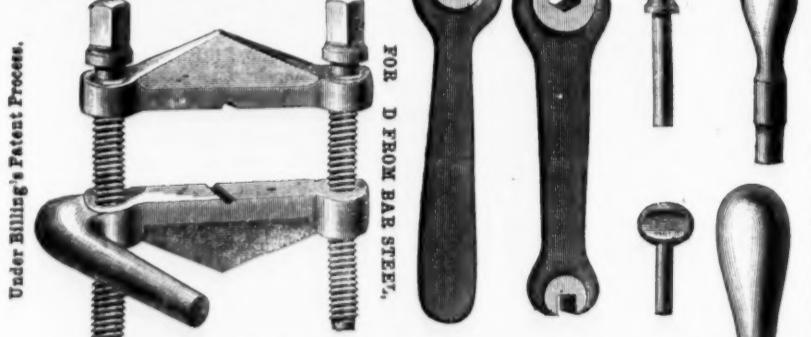
**Stearns' Hollow Augers
and Saw Vises**

**Bonney's Spoke Trimmers
Double Edge Spoke Shaves
Adjustable Gate Hinges
Scandinavian Pad Locks**

Flat Key Brass and Iron Pad Locks, &c., &c.

625 Market St., Phila., Pa.

**BILLINGS & SPENCER COMPANY, Manufacturers of
Clamp Lathe Dogs.**



And Hardened.
A First-Class Article, and something that every machinist and Tool Maker will appreciate.
WROUGHT IRON AND STEEL DROP FORGINGS
of every description. Machine Handles, Lathe Wrenches, Thumb Screws, Milling Machine Cranks, Spanners, Parts of Sewing Machines, Guns, Pistols, Drill Chucks, and MACHINERY GENERALLY.



TRADE MARK.
THE BILLINGS PATENT SEWING MACHINE SHUTTLE,
Thirty Varieties now made. Forged Solid from Bar Steel and Cold Pressed. Also,
The Barwick and Wheatcroft



Patent Self-Adjusting PIPE WRENCHES, of all sizes.
Illustrated Circulars and Price List sent to any order on request.

E. M. Boynton,
80 Beekman Street,
NEW YORK,
Manufacturer of

Saws of all kinds.
Also Sole Manufacturer of
LIGHTNING SAWS.

Two Direct Cutting Edges, instead of one Scraping point.



Note extra steel and durability over the old V, outlined on M tooth.

TELEGRAM DATED Oct. 1st, 1874.
STATE FAIR, EASTON, PA.

TO HENRY DISSTON & SONS: Philadelphia, Pa.

I want you to publicly test that challenge on Cross Cut Saws. Name time and place within thirty days. American Institute preferred. E. M. BOYNTON.

E. M. Boynton gave on Wednesday of last week an exhibition of his Lightning Saw could do at the Pennsylvania State Fair, in which two men sawed through a sound oak log, 16 inches in diameter, in 17 seconds. Mr. Boynton informs us that his export trade is increasing, he having lately made large shipments of his saws to Australia and other distant markets. —The Iron Age, Oct. 8, 1874.

For fuller report of this exhibition see the Eastern Morning Dispatch of Oct. 1st, 1874.

Henry Disston & Sons cannot furnish Lightning Saws. Why do they imitate mine?

J. FLINT,
Manufacturer of
ALL KINDS OF
SAWS
And Plastering Trowels,
ROCHESTER, N. Y.

A large Stock of Cross Cut Saws constantly on hand. Orders filled promptly. Dietrich's Double Handle and Max Crank Saws made with any kind of tooth desired. Our patent method of grinding Hand Saws makes them superior to any in the market. Send for Illustrated Price List.



**PUTNAM'S GOVERNMENT STANDARD
FORGED**
HORSE SHOE NAILS.

Manufactured from the best of NORWAY Iron, and warranted to give entire satisfaction.

**S. S. PUTNAM & CO.,
NEPONSET, MASS.**

**Rogers' Self-Sharpening
HOE.**

The best Hoe in market. It will not batter or break. Wears itself sharp. Will last twice as long as any other Hoe, and is warranted to cut the "Boles Hoe" or any Hoe in market.

For Sale at Manufacturers' Prices by
RUSSELL & ERWIN MFG. CO., - - - New York.
BYRNE & FITZSIMONS, - - - Albany, N. Y.
KENNEDY, SPAULDING & CO., - - - Syracuse, N. Y.

A. PARDEE, Hazelton, Pa. J. G. FELL, Phila.

**A. PARDEE & CO.,
303 Walnut St.,
PHILADELPHIA***

MINERS AND SHIPPERS OF
Lehigh Coals.

The following superior and well-known Lehigh Coals are mined by ourselves, and firms connected with us, viz.

**A. Pardee & Co. { HAZLETON,
G. B. Markle & Co. { CRANBERRY,
Pardee, Bro. & Co. { SUGAR LOAF**

JEDDO, HIGHLAND,

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OFFICES:

WM. LILLY, Mauch Chunk, Pa.

WM. MERSHON, Agent, 111 Broadway, N. Y.

WM. H. DAVIS, Agent, Easton, Pa.

**WHEELER, MADDEN
&
CLEMSON,**

Manufacturers of Warranted Cast Steel

SAWS

of every description,
including

Circular, Shingle, Cross Cut,

Mill, Hand, Roberts' and

other Wood Saws,

&c., &c.

Cast Steel Files

of the well known brand of

WHEELER, MADDEN & CLEMSON.

FACTORIES:

Middletown, Orange Co., N. Y.

BRANCH OFFICE:

97 Chambers Street, New York.

BRUNDAGE FORGED HORSE NAILS,

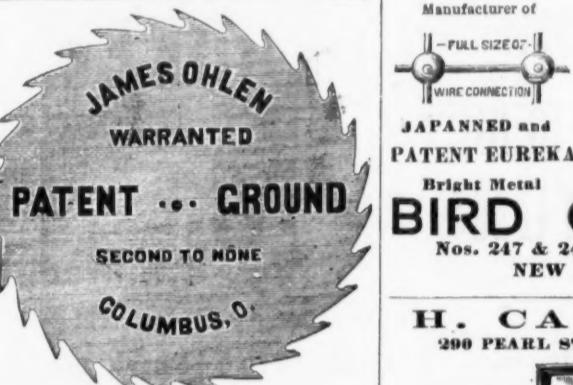
Manufactured from

BEST NORWAY IRON,

by BRUNDAGE & CO. Sold by

WHEELER, MADDEN & CLEMSON

Middletown, Orange Co., N. Y.



I make a specialty of the LARGEST SIZES of Circular Saws, and pay particular attention of lumber sections, the following points of excellence: EVENNESS OF TEMPER.—The peculiar structure of my furnace subjects all parts of the saw to a DEAD heat, and when dipped in the oil bath secures perfect uniformity.

PERFECT ACCURACY IN THICKNESS.—My saws are ground on a patent machine, automatic in its operation, grinding on the thick places in the rim, and the thinner parts are rounded, and when the saw is removed BALANCES PERFECTLY, which is proof positive of the right accomplishment of the work.

PROPERLY HAMMERED.—Great care is taken that no saw shall leave my works without due attention to this important part. A saw too tightly strained upon the rim, or too loose in the center, cannot be balanced, therefore the importance of so hammering the saw as to effect equal strain in all its parts, and at the same time RUN TRUE. This department is under the personal supervision of myself, and has been devoted over twenty years to the art of saw making.

I am sole proprietor and manufacturer of the celebrated "Challenge" Cross-Cut Saw. Price Lists of all kinds of saws sent on application.

JAMES OHLEN.

**V. G. HUNDLEY,
105 Rende St., N. Y.**

NORTH CAROLINA HANDLE CO.,

(Wilson & Shober, Props.)

Manufacturers of

AXE, PICK, GERMAN & AMERICAN

SLEDGE, and other Handles.

Full assortment always on hand.

VAN WART, SON & CO.

Hardware Commission Merchants,
BIRMINGHAM, - ENGLAND,
Agents,

VAN WART & McCOY,
184 & 186 Duane Street, N. Y.

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48 India Street, Boston.

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At each of these places a complete assortment of samples of Hardware and Fancy Goods will be found, including all new descriptions. Sole Agents for

John Rimmer & Son's Celebrated

Harness and other Needles.

Agents for

Seydel's "Ashanteen" Pocket Hammock

OSCAR IRVING VAN WART & CO.,

FORWARDING AGENTS.

2 South John Street, LIVERPOOL.

SCHOLEFIELD, GOODMAN & SON.

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Hardware Merchants,
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New York—Edward Firth, 16 Cliff Street,
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New Orleans—R. Rhodes, 71 Camp Street.

Montreal—J. J. Evans 14 St., John Street.

JOHN MAXHEIMER,

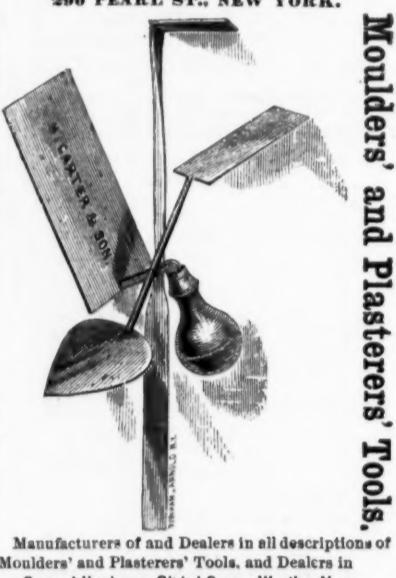
Patented,
June 3, 1862; April 6, 1869;
Dec 23, 1873; Jan. 20, 1874;
Dec 22, 1874.

Manufacturer of



BIRD CAGES.
Nos. 247 & 249 Pearl Street
NEW YORK.

H. CARTER,
290 PEARL ST., NEW YORK.



Manufacturers of and Dealers in all descriptions of Moulder's and Plasterers' Tools, and Dealers in General Hardware, Gilded Copper Weather Vanes, CARTER'S PATENT CARRIAGE LIFTING JACK, &c.

Moulder's and Plasterers' Tools.

Backus's Patent Bit Brace

AND
Angular Extension

BORER.

Q. S. Backus,

SOLE MANUFACTURER OF

ANGULAR EXTENSION BORER.

Salesroom, 82 Chambers St., N. Y.

This tool can be used in any brace, at any angle, and also for straight work. Is the best and most convenient tool of its kind ever offered to the public. Eight thousand sold the first year.

Also Manufactures the Straight Extension

Backus's Pat. Improved Bit Brace.



The socket is arranged so that the brace does not come on the jaws, but on the square hole, which fits the jaws. The bit is attached to the sleeve held firmly in the square, and center it truly. The sleeve and the stock is good. Its appearance is neat. Mechanics who have used it unanimously pronounce it superior to all others. It is the best brace in the trade as the strongest, most simple, and quickest operating brace in the market. We manufacture five sizes. The sizes of sweep correspond with the commercial number of the 1st.

Section of Socket.

Cutlery.

John Russell Cutlery Co.,
FACTORIES AND OFFICE,
TURNERS FALLS, MASS.

Manufacturers of

TABLE CUTLERY,
Butcher, Painters' and Druggists' Knives
IN GREAT VARIETY.

Extra Hard Rubber Handle Table Cutlery of our own Manufacture.

Fine Ivoride Handle Table Cutlery, very White and Durable.

Sample Office, 77 Chambers St., N. Y.

NORTHAMPTON CUTLERY CO.,

Manufacturers of all kinds of

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Cook, Butcher, Shoe and Hunting Knives. Sole Agents for Rogers' Cutlery Co.

Plated Forks and Spoons. D. P. GRIFFITH, Manager, 45 Murray Street, N. Y.

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MANUFACTURERS OF

Pen and Pocket Cutlery, Solid Steel Scissors, F. & L. Shears, Razors, Russia Leather Straps, Oil and Water Hones, &c.

Sole Proprietors of the renowned full concaved patent

"ELECTRIC RAZORS."

Also Agents for the BENCALL RAZORS.

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TABLE KNIVES AND FORKS OF ALL KINDS,

AND EXCLUSIVE MAKERS OF



And the "Patent Ivory" or Celluloid Knife. These Handles never get loose, are not affected by hot water, and are the most durable knives known. Always call for the Trade Mark "MERIDEN CUTLERY COMPANY" on the blade. Warranted and sold by all dealers in Cutlery, and by the MERIDEN CUTLERY CO., 49 Chambers Street, New York.

THE MILLER BROTHERS CUTLERY CO.,

Manufacturers of

PATENT FINE PEN & POCKET CUTLERY
WEST MERIDEN, CONN.

The only Knives made that are put together in such a manner that there is no strain on the covering or frail part of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the Best American Knife. We also make

NICKEL & SILVER PLATED POCKET KNIVES

which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other knife. Orders filled from the factory or by

J. CLARK WILSON & CO., 81 Beekman Street, N. Y.



BUCK BROTHERS, Millbury, Mass.

The most complete assortment in the U. S. of Shank, Socket Firmer, and Socket Framing Chisels.

PLANE IRONS.

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Cutlery.



PHILADELPHIA CORRESPONDENCE.

PHILADELPHIA, March 15, 1875.

Whether either from the adjournment of Congress, the approach of spring, the opening of navigation, or all combined, certain it is that business is improving on all sides, and the feeling prevails of an active summer. The coal trouble continues, however, without any immediate prospect of settlement, and a most startling and infamous appeal to Legislative interference with the business interests of the State has been sprung upon the public during the week. This was a bill offered before our State Legislature entitled "An act for the adjustment and settlement of disputes between persons, partnerships, associations or corporations engaged in the mining of coal or the manufacture and production of iron or steel, and their employes; prescribing how such employes shall be paid, and the amount of coal that may be stocked and kept in reserve by any person, persons, partnerships, association or corporation engaged in mining coal." The bill itself is too long for republication, as it fills some four or five columns of fine print. It is designated as Bill No. 478, and was first read by title February 26th, without attracting attention. For radical impudence, and communistic principles, it is equalled by no measure ever proposed to any legislative body of Americans. The provisions are substantially as follows: All persons, partnerships, associations and corporations engaged in mining and preparing coal, or in the manufacture and preparation of iron or steel for market, shall furnish, on the third Tuesday of every month, to the Secretary of Internal Affairs of the Commonwealth of Pennsylvania, to be filed in the Bureau of Industrial Statistics, a written detailed statement of their product during the previous month, with the price paid for mining or manufacturing same, and for transporting same to market, as also the price received for all sold during said month; the amount of money invested in the works and operations, the number of persons employed therein, and the wages and salaries paid to all such during the month. This statement must be sworn to, and provision is made for punishment for neglect. Any differences as to wages or other points between employers and laborers is to be adjusted and finally settled by a board of twelve persons over the age of twenty-one years, to be known as the Industrial Tribunal of Pennsylvania. This board is to be constituted of nine representatives of labor and two of capital, with the Secretary of State for the twelfth, to be drawn, as juries are, from names furnished from each district. Seven of this board are to form a quorum, and beside adjusting differences, may declare wages rates for any period. Wages to be paid every two weeks, and it shall be a misdemeanor to pay in goods, wares or merchandise, or to offset same against wages. The Industrial Tribunal is also to fix the amount of coal to be mined, under penalty of taking possession of the mines.

Such and similarly agrarian provisions comprise the rest of the bill, which has evidently been carefully and legally drawn by an able lawyer. Probably no similar document has yet seen the light, and its entire contents might be summed up in the communistic theorem that property is robbery. To listen to the reading of such a bill would be sufficient to cause the immediate withdrawal of all capital from industry. To attempt to enforce its provisions would cause a war which the whole military force of the country could not end. For the present the measure is defeated, but it is to be noted as an evidence of the radicalism and abundance of demagogues that a State Legislature may possess within its limits, that a number of members voted against laying it on the table. The only cure for such a spirit as is now rampant among the laboring classes, is to enact such laws as that, now before the Legislature, protecting the employment of apprentices, and establishing industrial schools as a part of our public system of education. This latter subject was warmly urged by Gov. Hartranft in his last annual message, but the Legislature has entirely ignored it, and will adjourn without any attention to a matter of almost vital importance to the interests of this great Commonwealth.

The annual meeting of the Stockholders of the Pennsylvania Railroad was held during the week. The particulars of the report having been made public previously, the principal subject of discussion, which was animated, was the restriction of the powers of the managers, as recommended last fall by the investigating committee of stockholders. This gave rise to some sharp criticism of policy previously maintained, but resulted in a triumph for the administration and the nomination, subsequently, of the former Board of Directors, who will undoubtedly be elected this week.

The Pennsylvania shareholders have very little if anything to complain of in the management of their property. They have at their head the ablest railroad manager of the world, and a man whose principal ambition is to make his road and connections the leading corporation of the world. The directors are all men of record among their fellows, and no city is better served, or has its interests better protected than Philadelphia by the Pennsylvania Railroad under Thomas A. Scott. The Centennial Exhibition will bear abundant evidence of this to the world, while it will in turn serve to draw great additional revenue to the road most nearly and closely concerned in bringing foreign trade here.

The gossip of the week is rather slim. The rolling mills in Kensington are all busy on orders, and times are lively there. The near-by mills, not running on bars or stopped for want of fuel, are engaged in the now fashionable business of making muck bar for Pittsburgh. The ship yards are fairly busy. The new yard of Messrs. Holmes, Shaw, Brown & Co., at Bordentown, has two vessels under way, and is contracting for new work sufficient to keep them busy at the year. The Reading and Lehigh Railroad has been absorbed by the Reading R. R. Co., under a lease for ninety-nine years, and will be hereafter known as the "Berk and Lehigh Branch." This gives the Reading Road a direct communication with the Lehigh Valley coal field. The annual report of the American Steamship Line, shortly to be issued, will, it is said, show a falling off in trade for the last year of only \$10,000, while one of the leading European lines, from your city, has lost \$750,000 in the past twelve months. Four new steamers are also to be added. The Mauch Chunk Gazette has the following notice of a Fairbank's railroad track scale near there, which shows a wonderful record: "The 123 feet railroad track scale built at Packerton (one mile south of Mauch Chunk) in June, 1872, by Messrs. Fairbanks & Ewing, for the Lehigh Valley R. R. Co., has done more weighing for the same time than any other scale in the world. Its average weighing per day is over 20,000 tons for every day in the year, an annual tonnage of over 7,000,000 tons. A single day's (24 hours) weighing has often exceeded 60,000 tons. The scale has been subjected monthly to the severe "Goodwin test," and has always been found correct. Although over 18,000,000 tons have been weighed upon the scale it has never yet required repairs."

Cork as a Non-Conductor of Heat.

A company has been organized in Paris for the purpose of thoroughly testing the well-known remarkable non-conducting property of cork. It appears that a number of steam pipes at several important establishments, had been covered with this substance; but the test of continued application was wanting. More recently, however, it has been stated that after standing eighteen months, the cork covering has remained intact, and is as perfect a non-conductor as on the day it was laid. Although the durability of the substance had been proved before by the buoys, which are partly immersed and partly exposed to the weather, its being able to stand such high temperatures as those of surfaces heated by steam at from seven to eight atmospheres had not hitherto been shown.

Now, felt which is a good non-conductor of heat when first laid, deteriorates very rapidly; although retaining its original appearance, it ceases to be effective after a few weeks, and ultimately tumbles into dust.

A fear of the same result occurring in the case of cork would, no doubt, be entertained by those who are unacquainted with its nature, but not by those who know the composition of this remarkable wood-like substance. To set all misgivings at rest, however, nothing is so satisfactory as actual experience, and there is no doubt that cork is now firmly established as the non-conductor par excellence. Its lightness, the readiness with which it yields so as to surround the cylinders or pipes it may be destined to encase, the facility with which it is put in its place, taken down, and put up again in the case of an inspection or repairs to a boiler or steam pipe, and, above all, its non-conducting power, effecting so great a saving of fuel, assure for it the highest place in the eyes of all manufacturers who regard their own interests.

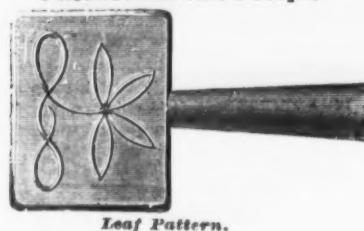
French naval engineers have made experiments on cork employed as a non-conductor, and have reported thereon to the Admiralty, which body has requested the manager of the company to appoint, at the five military ports, agents to attend to any orders which may be given. Theirs *cache* given by men so reserved as the French naval engineers, at once places cork in the first rank as a non-conducting substance.**Security Against Seizure of Exhibits at the Centennial.**—Director-General Goshorn has sent a cable telegram to Europe, contradicting the statement which lately appeared in certain German newspapers to the effect that, in case of the financial failure of the Exhibition enterprise, the goods of exhibitors would be liable to seizure. Mr. Goshorn's statement is fortified by an opinion of the Attorney-General of the United States, which removes all doubt on the subject.**Failure of Coal Companies.**—For several days past rumors of the failure of the Morris Run Coal Company, of Syracuse, and the Pittston and Elmira Coal Company, of Elmira, have been in circulation in Wall street. It was generally conceded at the time that the companies were in a questionable condition, that their paper had gone to protest, and that their formal failure was inevitable. Some of the friends of the concern, however, thought that their failure was only temporary, and such a statement was made at the office of the New York State Loan and Trust Company in Wall street. Yesterday, however, the following dispatch from Syracuse was received confirming the formal failure of both companies. The failure of Morris Run and Pittston and Elmira Coal Companies were announced to-day. Patrick Lynch, of Syracuse, is assignee of both companies. It is stated that the assets of Morris Run Company will more than meet liabilities, but some of the claimants are so pressing that the company deemed it best to make an assignment.

The Pittsburgh Commercial says: A project is on foot for supplying this city with gas from the Vandegrift well in Butler county, to supply the place of coal in our manufactures. Engineer Davis was applied to Saturday for calculations regarding the cost, &c., and it is not improbable that ere long the immense quantity of gas now going to waste at this wonderful well will be utilized in such a way as to save not only a heavy expense to many of our manufacturers, but our citizens from much of the annoyance they now suffer from soot and smoke.

The Austin Powder Company's mills, located near the canal, five miles south of Cleveland, Ohio, blew up on Tuesday afternoon with a series of terrific explosions. The works, which consisted of ten or twelve buildings, were completely demolished, large fragments of timber and heavy machinery being thrown a considerable distance. There were eight or ten men at work in and about the mills at the time of the explosion, three of whom were killed, the others escaping with a few slight bruises. The two magazines, in which is stored a large quantity of powder, are situated about forty and eighty rods from the nearest exploded mill and did not explode, although the roof and wall of the nearest one was badly torn by the concussion. The loss to the powder company cannot now be ascertained, but will be heavy. The buildings, with the exception of the engine-house, were of little value. The extent of the damage to the machinery is not known. The cause of the explosion will probably never be known, as the man at the coining mill, where the first explosion occurred, was killed. In the immediate neighborhood of the explosion houses were badly damaged, windows being broken and plastering torn off. The wildest excitement prevailed, many believing the detonations were caused by an earthquake. Houses rocked and shook, and people ran into the streets. The damage in the city is estimated at from \$25,000 to \$30,000. An explosion occurred at these mills three years ago, but little damage was done to property, except that owned by the powder company.

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Patent Embossed Steps.



King Bolt Yokes.



Established 1850.

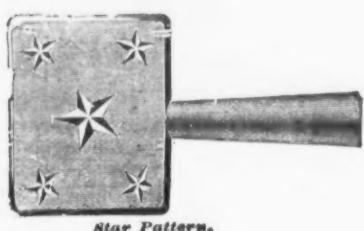
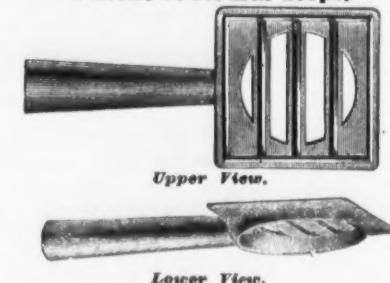
No. 6 Fifth Wheels.



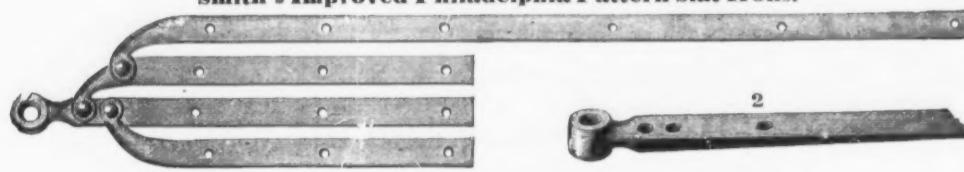
1871 Pattern Shaft Couplings.



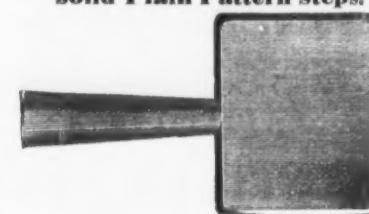
Patent Cross Bar Steps.



Smith's Improved Philadelphia Pattern Slat Irons.



Solid Plain Pattern Steps.



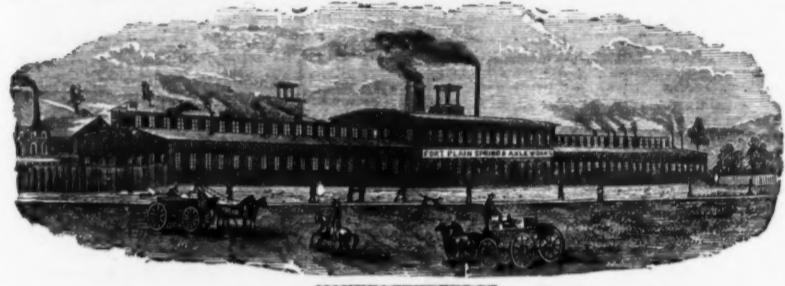
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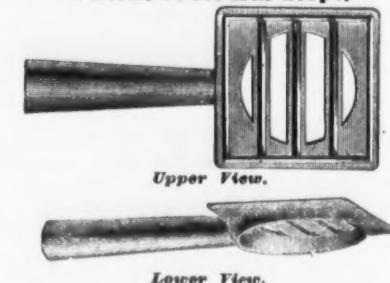
No. 6 Fifth Wheels.



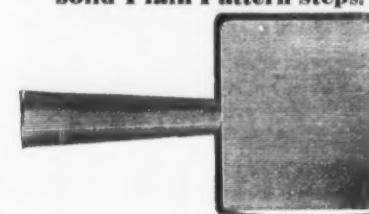
1871 Pattern Shaft Couplings.



Patent Cross Bar Steps.



Solid Plain Pattern Steps.



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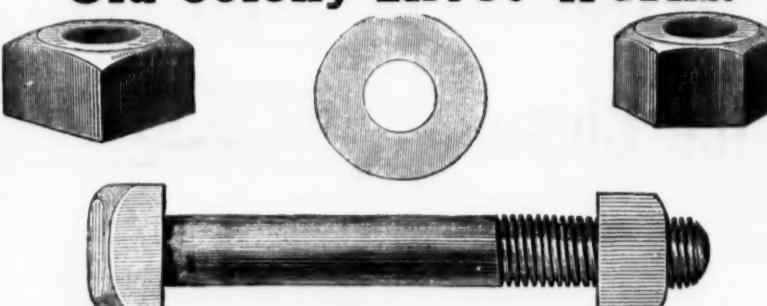
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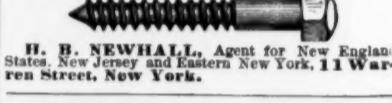
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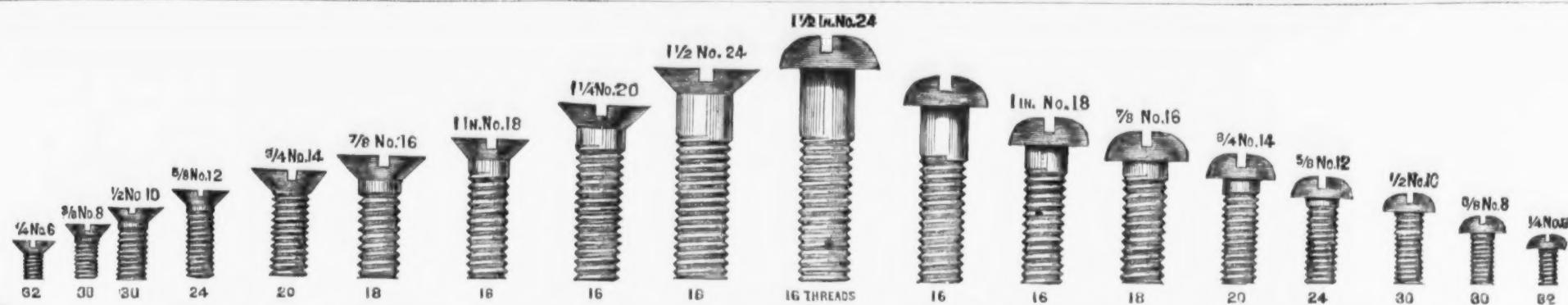
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The Iron Age.

New York, Thursday, March 18, 1875.

DAVID WILLIAMS - Publisher and Proprietor.
AMES C. BAYLES - Editor.
JOHN S. KING - - Business Manager.

NEW YORK, January 2, 1875.
Until the 1st instant the postage on newspapers was paid by subscribers at the office where the paper was received, the yearly rates on the different editions of *The Iron Age* being as follows: Weekly, 40 cents; Semi-Monthly, 40 cents; Monthly, 24 cents.

Under the provisions of the new postal law, which went into effect on the 1st instant, prepayment at the office of mailing is required, at the rate of two cents per pound for the Weekly, and three cents per pound for the Semi-Monthly and Monthly, which will make the postage as follows on the different editions: Weekly, 50 cents; Semi-Monthly, 30 cents; Monthly, 15 cents.

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The Policy of the Reading Railroad Company.

It is an unfortunate thing for the people of Pennsylvania that its great coal mining and carrying companies are practically beyond the reach of the people, and are in a position to bid open defiance to the popular will. Any legislation tending to restrict the powers or define the rights of the great corporations which monopolize the mining and carriage of anthracite coal, is promptly choked off; any attempts to investigate whether these great corporations have not assumed rights not accorded them in their charters, are suppressed at the outset; any expression of public discontent or dissatisfaction is regarded with

indifference. In a word, such a corporation as the Philadelphia and Reading Railroad is, practically, as independent of any interference with its policy of management, on the part of the people of Pennsylvania, as if it were laid on English soil.

For some years past that company has pursued a policy which all intelligent persons, especially local manufacturers, have regarded with apprehension and alarm. Controlling immense capital, it has steadily and successfully labored to absorb the business of mining, carrying and selling Schuylkill Valley anthracite, and the result has been the creation of a monopoly which, owing to the limited area of anthracite production, is, and must remain, absolute while it lasts. One by one the independent collieries would be worked under any circumstances, and from thirty to sixty days' notice of strikes or suspensions likely to interrupt mining, would be given. On the strength of these promises a number of furnaces blew in, only to find themselves betrayed. The company, after a few weeks, gave notice that they could take no more pig iron and make no more advances theron, leaving those who could not sell their iron to pile it up around their stacks; and now coal is cut off, and the managers of the company profess themselves unable to do anything for the furnaces, most of which will have to blow out again. The probabilities are that some of the weaker furnace enterprises will be bankrupted by this experience, and between this and spring it is not unlikely that the Reading Railroad Company will have acquired several more cheap titles to furnaces which, in times of greater general prosperity, will be found valuable property. With these facts before us, it is not to be wondered at that the iron masters of the Schuylkill Valley should begin to suspect the railroad company of a desire to monopolize the business of iron manufacture along its entire line and branches.

For the evils which threaten the best interests of the State of Pennsylvania from such a monopoly as that of the Reading Railroad, we know of but one practicable remedy. The public interest demands that all railroads should be required to haul the cars of any forwarder or consumer who may have freights to move, over the whole or any part of their lines. The rate for such haulage should be fixed by law at a price profitable to the railroads, and yet enough to enable forwarders who may choose to build cars to employ them profitably. This would at once give to coal lands owned by private individuals a value as great, in proportion to their extent, as those owned or controlled by the company, which could not then, as now, lock up all coal except its own by refusing cars in which to transport it. To require this of the railroad companies is only to protect the people of the State against the abuse of the valuable franchises granted to the companies, and to open the coal trade to free competition in the interest of the coal consumers of the State, who should have the advantage, in cheapness of fuel, of nearness to the sources of supply. We do not believe in legislative regulation of railroad management, nor in laws requiring the roads to do business at unprofitable rates; but the public interest overshadows all considerations of individual and corporate interest, and the latter should never stand in the way of a reform which the welfare of the whole community demands and renders necessary.

Iron Money.

We have probably heard the last of the kind of scrip which has passed under the general name of "iron money." By provision of the late act of Congress popularly known as the Little Tariff Bill, which went into effect February 8th, furnace scrip is taxed 10 per cent. upon the amount paid out. This practically taxes it out of existence, for no manufacturer could afford to pay such a tax, and, unless the law can be circumvented in some way, the furnace owners must dispense with the convenience of employing scrip in the adjustment of accounts.

For some reasons this action on the part of Congress is to be regretted, for others not. There have been times when these printed notes of hand, payable on demand in lawful money by the treasurers of the companies issuing them, have served a useful purpose as a circulating medium. This was especially true during the panic, when the banks locked up legal tenders, and where districts without adequate banking facilities were practically drained of currency. They have also served at times a very useful purpose as a medium of exchange between the servants of the companies and the tradesmen who, in the absence of currency, have taken these demand notes with confidence and have handled them as money. It is generally conceded, however, that while these notes have been a convenience, especially in the Northwest, there no longer exists a necessity for them great enough to justify their continuance in use, and a toleration of these issues of notes secured by nothing but the credit of companies which have, in some instances, uttered them for amounts beyond their capacity to redeem them in lawful money or bankable securities, might give rise to serious and far-reaching evils. Under the present law, national banking is made practically free to

sell it before or after delivering it to the railroad company if they could get a better price for it, on condition of returning the money paid them for such iron with interest at six per cent. per annum. In addition to this they were assured that they would be kept supplied with fuel. One or two collieries would be worked under any circumstances, and from thirty to sixty days' notice of strikes or suspensions likely to interrupt mining, would be given. On the strength of these promises a number of furnaces blew in, only to find themselves betrayed. The company, after a few weeks, gave notice that they could take no more pig iron and make no more advances theron, leaving those who could not sell their iron to pile it up around their stacks; and now coal is cut off, and the managers of the company profess themselves unable to do anything for the furnaces, most of which will have to blow out again. The probabilities are that some of the weaker furnace enterprises will be bankrupted by this experience, and between this and spring it is not unlikely that the Reading Railroad Company will have acquired several more cheap titles to furnaces which, in times of greater general prosperity, will be found valuable property. With these facts before us, it is not to be wondered at that the iron masters of the Schuylkill Valley should begin to suspect the railroad company of a desire to monopolize the business of iron manufacture along its entire line and branches.

Heating and Ventilation.

It is no new truth to those who have studied the statistics of nations, that the abundance or scarcity of fuel in a country, and the extravagance or economy with which it is used, have much to do with the intelligence, physical beauty and civilization of a people. This is a fact which we think can be made plain. In most countries of the world artificial heat is necessary, in order that a man may endure the climate without inconvenience. He must usually have a portable climate—that is, he surrounds himself with clothing by which the heat of the body is prevented from escaping. In addition to this, he uses fires to produce heat, and so keep up the proper temperature for the best action of the body. Human beings can endure great extremes of heat and cold. Dr. Kane and other explorers in Smith's Sound record 60° below zero, and even more—a degree of cold so intense that we can scarcely conceive the physical strain required to resist it. On the other hand, persons connected with establishments where drying rooms are kept at high temperatures, have breathed air heated 32° for five minutes at a time, and men have remained for some time in ovens in which meat was roasting beside them. Here is a range of some 385°, which the human body can stand for a limited time: 130° is about as high as a man can bear for any length of time, and do any work. So the range at which work can be performed is about 190°, or 200°. In the intense cold, the whole energy of the system is necessarily directed toward supplying the heat of which the body is so rapidly robbed. In hot countries the intense heat hinders the functions to such an extent that man is weakened and cannot produce his best work, he becomes exhausted and lives with the least possible exertion. Man's best mental and physical development can only take place in such a climate as is best adapted to his needs. So, in the olden times, before the art of warming and ventilating had received any attention, and before clothing was as well understood as in modern times, the best races were produced in such climates as those of Greece, Rome, Western Asia and Northern Africa. The climates were such that man did not need much clothing, and hence his physical and mental powers could be exerted with the least possible waste. As a matter of course, a fine race of people resulted. In the polar countries man is a miserable creature, below the average stature of the race, and spending his whole time in the struggle for existence. In England in ancient times, Buckinghamshire was well wooded, and had an abundance of fuel. These forests were in time, cut off to clear the country of the robbers, with which they were infested. The remote effect of this, which naturally made fuel scarce, was to dwarf the people and dull their wit. On the other hand, Sir Gilbert Blaine says that abundance of fuel, and its cheapness, in the county of Lancashire is extremely favorable to life, health and comfort; and he thinks that owing to this the people, especially the women, are noted for their fine forms and comely faces. This would be expected. No suffering is more effectual than cold and ill ventilation in deteriorating the human body, stunting its growth and preventing it from working freely and with ease. France has a better climate than Holland, yet, in the past century the inhabitants endured much privation from the want of fuel, and the average height of the men was only 5 feet 4 inches. In Holland it was 5 feet 6 1/2 inches, and in England, with even then an abundance of coal, it was 5 feet 9 inches. In Sweden an abundance of cheap fuel gives a strong, hardy race in spite of a severe climate. But the northern races of men, even with abundant fuel, are always liable to fall a prey to diseases bred of foul air. The intense cold makes them dread ventilation, and consumptions and other forms of disease are easily engendered. Northern New England is famous for its consumptive tendencies, and these cannot fail in time to tell upon the physique of the race, unless greater attention is paid to the warming of sleeping rooms and the general ventilation of houses. To warm the whole house is necessary. People in passing from one room to another do not like to put on an extra garment, and yet the hall through which they have to pass may be as cold as the air outside. This produces a shock and a drain upon the vitality, and should be avoided. In the winter of 1867, in a northern New England town, the writer woke several mornings with the moisture from the breath frozen upon eyelashes and beard, and the pillow also frozen where the damp

ness of the breath had condensed upon it. Such cold bedrooms cannot fail to seriously affect the health of the people. Ventilation in such room is impossible; one can barely keep alive in so low a temperature, and to bring in colder air from outside would render freezing almost certain. Warmth, then, is absolutely necessary before we can think of anything else. The room must also be so arranged that the air may be kept pure. Years ago London was more healthy in winter than the surrounding country, which was attributable to the fact that cities are always warmer than the rural districts by several degrees, consequently there would be less suffering, better ventilation and less disease, other things being equal.

With these facts in mind, we at once come to understand how vitally important it is that our houses should be perfectly warmed and ventilated. In the more northern portions of the country the climate makes warming imperative, and people are not likely to suffer in the winter. In the Middle States the case is different. Winter lasts but a short time, and is too generally regarded as an exceptional season. The past winter was so regarded everywhere in this country, but we know that severe winters do occur at longer and shorter intervals, and it is for the extremes that a house should be prepared. Our warming apparatus, as the rule, are altogether too small; every winter has days in which they are wholly deficient in power to keep our houses comfortable. The cold Sabbath always find our churches uncomfortably chilly, and yet generally it will be found that more than enough fuel has been wasted to comfortably heat the building, had the proper apparatus been used. It is always to be remembered that a large fire burning slowly is much more economical than a small one burning rapidly, even when both consume an equal quantity of fuel in a given time. On the ground of economy, therefore, the best policy is to provide abundant means of heating, even in the coldest weather.

We call attention to these facts at this time for the reason that the spring season usually witnesses a considerable activity in building operations, and throughout the country architects and builders are maturing the plans of dwellings, churches, &c., to be built during the coming summer. To all such we would say: When you plan the arrangements for heating, base your calculations upon the use of furnaces which are large enough to warm a large volume of air to a moderate temperature, and which will comfortably heat your houses in the coldest weather which the climate of your locality permits, without requiring them to be driven beyond their capacity. In moderate weather such furnaces can be run very economically with less fires, and, if properly managed, need not overheat the house. In very cold weather more heat can be had by increasing the supply of fuel and promoting more rapid combustion, without necessitating the over heating of any part of the furnace. Pure air warmed by contact with a large heating surface, to a moderate temperature, is not vitiated—unless it has taken up gas from leaks in the furnace—and may be breathed without danger to health. Air heated by contact with the red hot heating surface of a furnace driven beyond its capacity is vitiated and poisoned, and cannot be breathed without danger to health. A small furnace overheated is dangerous in many ways. It vitiates the air passing through its flues, it is liable to overheat the flues and set fire to wood-work, it warps and twists out of shape, and is quickly burned out. It is, therefore, a mistaken economy, however considered, to put into a house a furnace which needs to be driven at any time to make heat enough to maintain a comfortable temperature. A furnace large enough to keep a house warm in the coldest weather without at any time being heated to redness in any part, is the cheapest, whatever its first cost as compared with smaller sizes. With large furnaces, moreover, we can have better ventilation than with small ones. If a large body of pure air of moderate temperature is poured into an apartment, more of the vitiated air can be expelled or drawn off than is possible when the inflow from the registers is small in volume and high in temperature. These remarks also apply to stoves. It is never profitable to buy a stove so small that a hot fire must be maintained in it to keep the apartment comfortable. A larger stove, intelligently managed, will be found more wholesome, more comfortable and more durable.

We have been asked for the address of Wm. A. Shaw, of New York, whose patent for an improved process of refining lead was published in our issue of February 4th. If any of our readers can tell us where the gentleman in question can be found, we will be under obligations.

An act is now pending in the Pennsylvania Legislature which has received very general and hearty approval from press and public. Its object is to protect children of the State in the right to learn useful trades, and declares unlawful all attempts to discourage or prevent children from learning trades or employees from engaging as many apprentices as they may have use for. This is a direct blow at a gross abuse. One of the worst and most wholly objectionable features of trade union control, is that the number of young men and boys who are permitted to learn trades is limited, in order that no competition may grow up which will deprive the mechanics who compose these unions of their present monopoly of skill and knowledge. In consequence of this exclusion of boys from the mechanical trades, a great majority of the rising generation are debarred from entering or acquiring a knowledge of them, and are driven to find a precarious support in the several branches of distributive industry which are already overcrowded. The selfish and cruel policy of the trade unions in this matter should be suppressed by the most stringent laws, and the public should insist upon the rigid and impartial enforcement of those laws for its own protection. The statistics of pauperism and crime show that a very large proportion of those who find their way into prisons and alms-houses have no regular occupation. A man with a trade is pretty sure to be a useful, if not a moral, member of the community, and any attempt to prevent young men from learning trades, whatever the object sought to be accomplished by this means, tends to corrupt the public morals and to create paupers and criminals.

New Publications.

Transactions of the American Institute of Mining Engineers. Vol. II., May 1875 to February 1874.

The bulk of this volume consists of papers read before the American Institute of Mining Engineers at meetings held between the dates given on the title page. Glancing over the contents we find many valuable treatises on mining and metallurgy, which will be found of great use for reference by all iron masters, metallurgists, and mining engineers. Among those who have contributed papers we find the names of many of our most intelligent and progressive metallurgists, whose views and experiences cannot fail to be of interest to all intelligent students of the same branches of science. The Transactions are printed by the institute, and copies may be had by addressing Prof. Thos. M. Drown, Secretary, Lafayette College, Easton, Pa.

The Inexpediency of an Irredeemable Paper Currency, being an Abridgement of the Chapters from the Principles of Political Economy on Money and Credit, by John Stuart Mill. Price, 10 cents.

One Currency: What It Is, and What It Should Be, by John G. Drew. Price, 20 cents.

We have here two little pamphlets, published by Henry L. Hinton & Co., 74 Broad Street, and Henry Carey Baird, Philadelphia, which are evidently intended to aid in popularizing political economy. Mr. Mill's Principles of Political Economy is so well known that no comments upon a condensation of its chapters on money and credit are necessary. Mr. Drew's little pamphlet differs radically from the views expressed by Mr. Mill, and rather suffers by contrast when read in connection with its companion volume. We cannot approve its position nor accept its conclusions, but there are many who will endorse both.

We also have from Mr. Henry Carey Baird the announcement of a volume which will devote 374 pages to the advocacy of a system of finance which we do not think will ever be adopted—making greenbacks interchangeable with government bonds bearing a low rate of interest. It is entitled: "A New Monetary System; The only means of securing the respective rights of labor and property, and of protecting the public from financial revolutions," by Edward Kellogg. Unless this volume can show some better reason than has yet been advanced why the government should go into the business of paying interest on the unemployed money balances of the country, we do not think its reasoning will be conclusive or satisfactory.

Guaranteed Iron Ores.

EDWARD J. HALL, Jr., Blast Furnace Engineer.

The quality of pig iron is determined so directly by that of the stock used, that it would seem absurd to expect a good and uniform product without carefully securing uniformly good stock; in numbers of works, however, this fundamental principle is apparently considered of but little practical importance. It is no wonder that, in view of this, so many furnace men consider it impossible to bring all operations strictly under control; that a big cast is good luck, and a poor run a "mysterious dispensation of Providence."

A very large number of unsuccessful blasts can be directly traced to this single cause—"poor stock." Thousands of dollars have been wasted in the fruitless endeavor to make good iron with combinations of stock which no amount of skill in the founder could possibly keep from turning out worthless metal.

An iron made from No. 2 ore may have, and generally does have, entirely different qualities from one made of the first grade. It is generally understood that in 1872, owing to the sudden and enormous demand, a very large amount of No. 2 stock found its way into the

market; the effect of this was to change entirely the product of many furnaces; for instance, stacks which had been producing first-class red short iron made neutral, and sometimes rank cold short metal. The evil results disturbed the mill men, because it disarranged all their established mixtures; one Pittsburgh mill which had been using five red short to four cold short, had to change to eight and one-half of the so-called red short and one-half cold short. At that time the evil was so marked as to attract general attention, but its present extent is totally unappreciated. What may be called the large factor of safety in blast furnace operations, conceals the effects of a vast amount of bad materials and blundering practice; the fatal result is, nevertheless, sure to creep into the balance sheet, and, although the cause may not be directly apparent, in many cases it would be neither hard to find nor difficult to remedy.

If the quality of ore changes without the founder's knowledge, he is working entirely in the dark, and will waste a hundred times the cost of accurate analysis in experimental efforts to obtain good results. For instance, an ore is bought on the supposition that its analysis is as follows:

Peroxide of iron.....	75.30
Manganese.....	0.15
Alumina.....	1.00
Lime.....	1.00
Magnesia.....	0.94
Silica.....	10.12
Carbonic acid.....	5.41
Phosphorus.....	none
Sulphur.....	0.03
.....	100.68
.....	52.71

Metallic iron.....
Its treatment in the furnace is based on this, but, after a time, an analysis of the ore actually delivered gives this result:

Peroxide of iron.....	66.05
Alumina.....	2.44
Lime.....	7.37
Magnesia.....	0.47
Silica.....	23.00
Waste.....	0.65
Phosphorus.....	none
Sulphur.....	0.21
.....	100.11
.....	46.24

Metallic iron.....
Here is a very serious loss to the purchaser in a deficiency of more than 6 per cent. of iron, and an injurious excess of 13 per cent. of silica, with no increase of compensating ingredients. It is clearly manifest that any calculations based on the first analysis would be entirely worthless in determining proper mixtures to secure a given result. In another case a so-called No. 1 Lake Superior ore analyzed less than 55 per cent. of iron, and contained considerably over 20 per cent. of silica.

More than 50 years ago a foreign writer very pertinently said on this subject:

"I would here call attention to the exceedingly uncertain and deceptive nature, not only of many of the preceding, but of nearly the whole of the following minerals (many of which, to the eye, as well as from their specific gravities—which points I have discarded as criteria by no means to be depended upon—would indicate that a fair amount of iron may be expected from them), were not only perfectly valueless as iron making materials, but would have proved excessively injurious in the smelting furnaces; for had not these analyses been attended to, there is not the slightest doubt but thousands of tons of such worthless materials would have been introduced into blast furnaces, whereby would have been inflicted an incalculable loss upon the proprietors of iron works, not only from paying a comparatively large amount of money for such minerals in the first instance, but from the prodigious damage that would have been done to good materials—probably to fifty times their first cost. Surely there is no rule or reason why an iron master should not avail himself of all possible scientific means in aid of his great undertaking, equally with those parties who engage in copper smelting. These gentlemen will never buy a pound of ore until its yield has been accurately ascertained; and I hope to see the time when iron smelters will rigidly follow so good an example. By placing the iron ore trade on this system, a complete certainty would very soon be arrived at that would add much to the convenience and benefit of the managers of iron making establishments, and, at the same time, secure to the sellers and getters of ores the full value of their several commodities, and a good and constant demand also—at least, for all ores really worth having; but all impositions and deceptions in the matter, whether designedly or otherwise attempted, would here be brought to an immediate and final end. 'Deceptions' which (although, in the majority of cases, no doubt unintentional) have cost, and will again, if a more general appeal to scientific examinations be not adopted with respect to the working value of iron ore, countless thousands of pounds in money and vexations and disappointments, in a manner, without end."

He then gives some sixty analyses, many of which show less than 5 per cent. of iron. It seems almost incredible that such stuff should be bought and sold as iron ore, but I know of a similar case which occurred less than five years ago. An ore for which a high price was paid proved to be absolutely nothing but limestone, tinged with peroxide of iron; still, its external appearance would have deceived most furnace men. In this case the purchaser found himself entirely without any remedy, and the so-called iron ore was finally worked up as a substitute for limestone.

There is another side to this matter, and the loss, though generally, is not always with the furnace owners; an ore which was supposed to yield about 40 per cent., and was purchased on that basis, afterward yielded nearly fifteen per cent. more.

A system in which such mistakes (or frauds) are possible, is, on a larger scale, an exact counterpart of the school-boy transaction of "swapping jack-knives 'inside unseen.'

If the published reports of new ore discoveries are to be believed, we must conclude that

60 per cent. ores (occasionally they run up to 90 per cent.) containing no injurious substances, are to be found in abundance in almost every State. Generally these accounts are based on analysis by strictly honorable chemists, and these analyses really represent the exact character of the samples presented to them; but sometimes the analyst gives a report which is, in his opinion, best calculated to please his employer. In either case not one in ten of the mine owners would guarantee deliveries of large quantities up to the published standard; still they use this false valuation in determining the selling price. It is clearly in the interest of furnace owners to have all contracts based on a distinct agreement as to quality in all the constituents of their ores. The owners of really good mines would be just as materially benefited, because the price of their products would not be "cut" by the venders of rubbish. A good article would be sure of a fair price, while worthless stuff would find no market except with the old rule-of-thumb men.

Furnace operations would be largely simplified, the product would be more easily controlled, and results far more certain. It is to be expected that the change will meet with opposition from the owners of doubtful mines, but it is certain to come, and, in fact, some works are now adopting a very similar plan. The great question now is to secure the best plan for obtaining suitable guarantees, and then to bring about its general adoption. A free discussion of the subject by both parties through the trade journals, or in their associations, would throw a vast amount of light on it, and do much to secure a just and equitable arrangement. It seems impossible to establish any arbitrary standard which shall be universal in its application, for the reason that the points of excellence vary so much in the different kinds of pig iron. What constitutes a No. 1 ore must be determined more by the requirements of individual consumers than by any combination of manufacturers or miners. But while each establishment fixes its own standard, and determines its application, it is imperatively necessary to have a sound, general basis from which to calculate all values; this basis, it seems to me, can only be accurate chemical analysis; that is exact, unfailing and universally applicable.

A gentleman who noticed the difference between his analyses and his stock book, said: "I do not care what my ores will analyze, I want to know what they will yield in the furnace." He thought that the ore companies should guarantee the per cent. of yield in the furnace. In this case the lack of correspondence between analysis and practice, was due either to incorrect analytical work, or a failure on the part of the miners to deliver the sample quality of ore. There should have been hardly any variation; indeed, with soft gray iron the yield should apparently exceed that required by analysis, owing to the presence of foreign substances in the pig. If it fall much below, either the analysis is incorrect or the management faulty. To require a guarantee of yield in the furnace would be unfair for both sides. Sometimes a great deal of stock is wasted, and then the ore companies would lose unjustly, while at another the yield of iron might be good, when a change in other constituents rendered the ore almost valueless. Such tests are uncertain always, particularly so when several varieties of ore are used, and the method is, at best, a crude and unsatisfactory way of estimating values which depend on so many more qualities than the yield of iron. Then, too, a settlement of accounts would necessarily be deferred until the ore had been used, and in case of any controversy as to its value the only unanswerable witness—the ore itself—would be gone, and endless confusion and litigation would ensue.

The most exact and satisfactory way would be to have the ore dealer furnish an analysis which he guaranteed to represent the exact character of ore to be delivered, the per cent. of iron being the least, and of impurities the greatest allowable. From time to time, during delivery, the furnace company must ascertain the quality arriving, and in case it fall below the given standard, the ore dealer must be at once notified, and the value of the lot determined by agreement or expert arbitration, the whole expense being born by the party in fault. If the furnace company fail to make the analysis, or to report at once any failure in quality, the ore shall be paid for at the standard valuation. If, when notified, the ore dealer does not beforehand agree upon a reasonable, he shall settle on the basis of the furnace company's report.

This system at first sight may seem a little expensive and troublesome, but the ore companies would seldom fail to secure such thorough inspection at the mines as to avoid all difficulty with purchasers, and in any event it will be found far less costly to pay for a few analyses than to give, as is often done, from 10 to 50 per cent. more for ore than it is worth; the trouble is nothing in comparison with the damage inflicted on furnaces and business by an occasional run of poor stock.

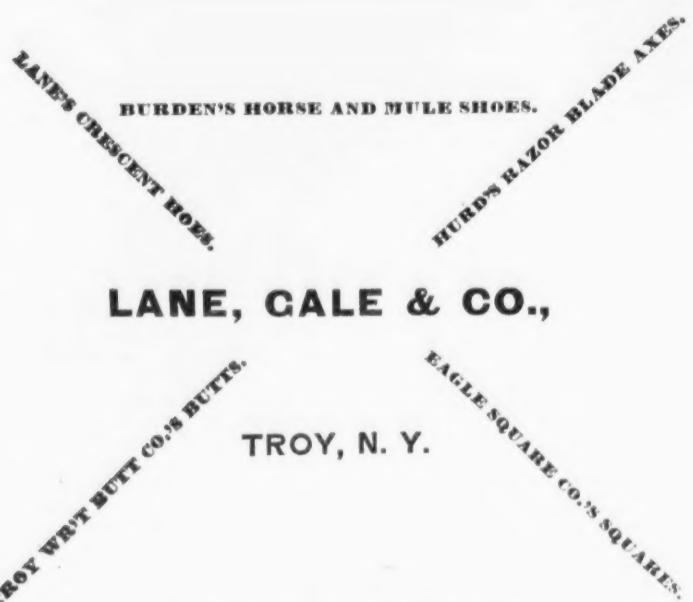
American and British Patent Law Reform.*

The state of its industrial arts is the truest index to the civilization of any people. For it is through these that humanity adjusts itself to the conditions of existence by bringing itself more and more into accordance with those laws of the Infinite, by which all mental, moral and physical development is regulated and controlled. And that nation must progress most rapidly in which the popular intellect is the most active in discovering new applications of

natural forces in aiding or supplanting the labor of human hands. To secure this activity an appeal must be made to the self interest of the individuals who compose the mass, and this appeal must be made in such wise as to reward the individual for every contribution to the common advancement, otherwise he will have no incentive to exertion and will make no effort. In the middle ages, and in remote times, the favoritism of princes gave fitful encouragement to inventions of new arts, or to skilled operators in those well known, and this encouragement often took the form of a special privilege, sometimes of an exclusive right to practice the improvement, and it was in this manner, at a date so remote and under circumstances so uncertain that neither time nor land can be given, the practice of granting patents for useful inventions was initiated. These privileges were by special grant and favor of the king, but in 1623 the enactment of the famous statute of monopolies by the Parliament of Great Britain expressly recognized the issue of patents for inventions on the grounds of public policy, and the courts of England adjudicated actions of infringement upon patents thus issued, settled in definite form the ethical and legal basis of such grants. They held that the issue of a patent was in the nature of a contract between the public and the patentee. The public, needing inventions, offers to pay for them by a monopoly of their use and sale during a limited period. If the invention is useless the patent is void, because the patentee has given no valuable consideration for it. If his patent is too obscure to enable his invention to be understood, or if it claims more than he has invented, or if it contains other errors or misrepresentations that seriously mislead, it is void, like any other contract under the same conditions, on the ground of fraudulent suggestion. The system of granting patents, therefore, is based upon these four propositions that grow out one from another. Society needs new and useful improvements in the arts and industries; in order to obtain them it must and should pay for them. The easiest and most just method of payment is to allow the inventor an exclusive right to make all he can from his improvement during a limited time, the reward being thus made dependent upon the merit of the invention and the efforts of the inventor to make its advantages known to the public. The patent being in the nature of a contract, holds the public and the patentee to mutual good faith, the one to protect the inventor within the limits of his grant, the other to make his invention as beneficial to the public as possible; firstly, by working it for his own profit during the term of his patent; and, secondly, by throwing it open to the public in its perfected and working form at the end of its term. These simple propositions embodied in tangible formulas, and enacted into positive law, have been the inciting cause of the industrial progress of the past two hundred and fifty years. The founders of the system, building wiser than they knew, succeeded in putting into practical operation a branch of law that has well been termed the metaphysics of jurisprudence, for the purpose of promoting the commonest arts of life. They did it by basing the interests of the concrete man as embodied in the state, upon the interests and aspirations of the individual, and pledging the authority of the one to protect the efforts of the other. The result has been that, during these two centuries and a half, the Anglo-Saxon race has been a race of inventors, of mechanicians and manufacturers, of chemists and engineers, and to this more than all else has Great Britain owed her dominance in war and her supremacy in commerce; to this more than to all else our own people owe the rapidity with which they have covered a continent with tillage and manufactures, and passed scatheless and unharmed through the vicissitudes of revolution. Said Napoleon at St. Helena, "England conquered me not by her arms but by her spindles, for with these she subsidized all Europe." But these spindles would never have fought their way against the clamor of ignorant times, and proved their value in the factories of Britain, had not Arkwright's patent of 1785 incited him to overcome all difficulties by the promise and hope of reward. And it may be said as well of inventors of the engine that drove the spindles, the loom that wove the yarn into fabrics, and even of the metal of which spindle and engine were made. For James Watt would have failed, had not Boulton been induced by a share in his patent to carry the experiments to completion, and demonstrate the cheap and effective use of steam as a motive power; and Cartwright aimed at securing the patent of which he was afterward defrauded, even before he had brought his weaving machines to perfection; and the patent of Dudley, who, in 1621, first successfully made iron from "pit coal" instead of charcoal, of Prince Rupert, who, in 1670, had an improved process of converting iron into steel; of Cort, who, in 1784, invented the process of puddling, show that these men were urged to their efforts by the promise of substantial financial profit, and not by an empty desire for praise. Why do I illustrate by these examples (drawn from among scores of others) the truth that inventions are beneficial to the State, and that it is through, and only through, the enactment of patent laws that such inventions will be made? I do it as preliminary to a consideration of British patent law reform; because Sir William Armstrong, who has acquired rank and fortune through patents on inventions that he never made, has denied the first clause of this proposition, and Mr. MacTie, a member of Parliament, has earned a cheap notoriety by denying the second, and to these two men, more than to all others, is due an agitation of the British patent question that seeks to nullify a system that, just to the inventor and just to the public, has led mechanicians of England to exert themselves

to the utmost to build up her industrial wealth, and the commerce that is based thereon. Here, in America, the issue of letters patent for inventions based upon the same ethical principles as in England, has been equally marked in its results. Eli Whitney would have thrown the cotton gin into the scrap heap, had not his patent offered the promise of return for his outlay. John Fitch would never have persevered until he had demonstrated the practicability of steam navigation, had it not been for the patent he held from the State of Pennsylvania; nor would Robert Fulton have succeeded had not Chancellor Livingston been lured to his aid by the advantages of a patent from the State of New York. In the introduction of an improvement, no matter how meritorious it may be, there are always old prejudices to overcome, old usages to be disturbed, many experiments to be made, and an outlay, often excessive, to be incurred in establishing the manufacture. In majority of instances, the inventor has not the capital to accomplish all this, and must seek the assistance of those who have. Who would venture their assistance if no chance of its return were available, and no chance is available except by means of a patent. Even if the inventor always possessed the requisite means, would he be justified in their expenditure if, after all the cost of developing an invention and proving its usefulness, others could step in and appropriate the experience and skill displayed in the invention, and the money embraced in its perfection, to which they had contributed nothing. No man will sow, knowing that another will reap, and no inventor will invent and no capitalist will develop an invention, if he is taught that he shall not gain thereby. This truth, that patents should be granted on grounds of public policy as well as of ethical justice merits full stress at the present time when, in this country as well as in England, a misunderstanding of their true nature is leading to something of a feeling inimical to them. There is, indeed, no department of industry, no branch of science, no comfort of the household, no aid to the farmer, no tool of the workshop, no luxury that adds to the enjoyment of life, but has been fostered by the patent laws, and in ninety-nine times in a hundred been indirectly produced thereby. The sewing machine would never have found capital for its improvement, manufacture and sale had it not been for the promise of profit held out by the inventors thereon, and who will deny the benefits it has conferred upon the world? upon the poor even more than upon the rich. The electric telegraph would never have passed beyond an experiment had not Professor Morse's patent enabled him to sell fractions of his invention for means to perfect it. Without patent laws we would have had no harvester for grass and grain, for the patent law led hundreds of ingenious men to strive year after year to produce a practical reaper and mower, until at last from, among a thousand failures, there sprang the dozen practical improvements that multiplied ten-fold for all lands and all times the power of the laborer's arm in the hay and harvest field. And only a dozen years ago, when the war sifted the strongest from farm and village, the harvests would have kinked uncut to the ground had it not been for machines that would have had no existence had it not been for patents, and a remark of like meaning applies to the seeding and planting machines used in the prairies of the West, by which horses are made to multiply manifold the work of men. Indeed, no stronger illustration of the bearing of patent laws upon the welfare and power of a people can be found than is afforded by the contrast between the Northern and Southern States previous to the war. The North had appreciated and encouraged patents. Patents had built up manufactures and improved agriculture, and as a result the improvement of industries had led to production of wealth to well tilled farms, to great cities, and innumerable thrifty and populous villages. In the South patents were disregarded, the mechanical arts were ignored, the population was scattered, the cities entered for the transhipment of staples, the villages sparse in people and far between. No lustre of statesmanship, no ardor of hope, no sincerity of purpose, no heroism in battle could make up for the fatal error of disregarding the power which industrial art adds to the resources of nations, and the result only showed what all history had shown before, that success in war rests upon the arts of peace, that the anvil and sickle must uphold the sword.

So much then for the utility of patent laws; they cradled the arts in their infancy, they bore them up in their struggling youth, they are urging them onward to new triumphs in their buoyant manhood, they hold out at once the incentive and the promise of a progress in the future of which the world as yet but dimly dreams. Thus the first question sprung in all discussions of change or reform in the patent laws, whether they are truly a benefit to the public, is fully answered by the experience of the race that first gave them the form and the force of statute law, and which has tried them the longest and most thoroughly. And now let us pass from this consideration of the nature and results of patent laws *per se* to that of the changes required in American and English



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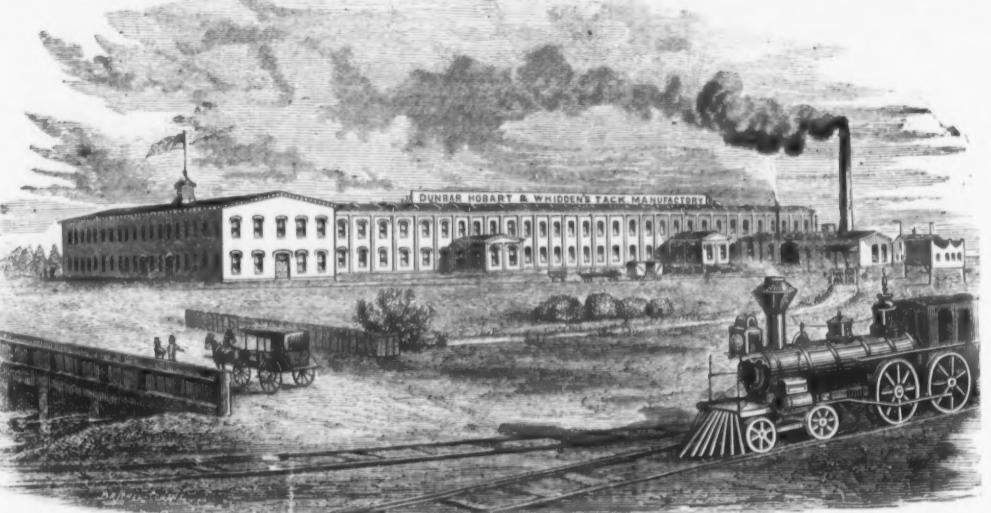


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Sanitary House Drainage.

The following paper was read before the Public Health Association, of New York, at the School of Mines, Columbia College, Thursday evening, March 11th, by Mr. James C. Bayles, Editor of *The Iron Age*.

MR. CHAIRMAN AND GENTLEMEN:—I shall have the pleasure this evening of presenting for your consideration a few facts and suggestions relating to the subject of house drainage, as regarded from a sanitary point of view. My remarks will be limited to the drainage of houses provided with more or less complete systems of service, waste and soil pipes, with water closets, and with sufficient water for flushing—which includes a very large proportion of the dwellings within our city limits.

HOUSE DRAINAGE THE CONSUMMATION OF HYDRAULIC ENGINEERING.

A well devised and well executed system of plumbing work in a house, with its pipes for distributing water and carrying off all liquid refuse, its water closets, baths, &c., is the crowning point of a vast system of hydraulic engineering, which is the outgrowth of a high and regularly developed civilization. Great aqueducts, costly and capacious reservoirs, hundreds of miles of mains and thousands of miles of distributing pipes, great and costly systems of sewers and networks of metal tubing, are all necessary. In every part, the work which precedes the introduction of water into a city dwelling must be well done, at great expense to the public, by accomplished engineers. Nothing can be slighted or neglected, and every detail of the great system must be as perfect as possible to meet the public necessities and satisfy the public expectation. And yet, how often do we find that the work of connecting our houses with the pure water supply, on the one hand, and the sewers on the other, is done so carelessly, with apparatus so imperfect, and with so little regard to sanitary laws on the part of the plumber and those who employ him, that the tenant of the average city house would be better off if the great engineering works undertaken to render house drainage possible had never been consummated. As the rule, though not invariably, as I shall show, the fault is less with the mechanical workmanship than with the defective character of the arrangements employed. A mistaken economy, which seeks to reduce the cost of internal fittings, that the more may remain for external and internal ornamentation, often forces the contracting plumber to neglect the many precautions against the inflow of sewer gas which his experience has taught him are essential to health. Let the blame rest where it properly belongs. So long as people who live in houses neither know nor care whether the plumbing work is well done or not, provided their walls are not stained by leakage from the pipes or tanks, nor their nostrils offended by foul odors from known and easily discovered sources, so long will contracting builders demand cheap work from the plumbers, and the plumbers furnish it. The only means of guarding against serious danger to the public health from this cause, beyond what little the Board of Health can do in this direction, is in keeping the subject before the public until, by impressing the intelligent reading classes with its importance, we can secure attention to such recommendations as we may have to offer.

POPULAR INDIFFERENCE TO SANITARY SCIENCE.

The indifference manifested by people in all classes of society with regard to the Department of Sanitary Science which deals with house drainage, is, I think, attributable to popular ignorance. Comparatively few people know what sewer gas is, and those who have been connected with the corps of city sanitary inspectors have, doubtless, found that a majority of people believe there is a great deal more talk about it among those who claim to be scientific sanitarians than its importance really warrants. This is a serious mistake, which cannot fail to imperil the public health by giving rise to a false sense of security, and encouraging the toleration of dangerous nuisances. The experience of centuries has taught that the gases generated in sewers are dangerous to health. These are chiefly carbonic acid, nitrogen, sulphured hydrogen, ammoniacal compounds and fated organic vapor. Of these hydrogen is the least formidable, although it will not support animal life. Carbonic acid is too well known to need description; sulphured hydrogen is, I believe, one of the most poisonous gases of known composition; and the fated organic vapor, concerning which but little can be definitely known, is probably the most dangerous, because most subtle, of all the emanations from decomposing sewage. In well ventilated sewers, analysis shows the presence of carbonic acid, nitrogen, sulphured hydrogen and traces of other gases mentioned: but the sewers of New York are not well ventilated. Indeed, as I shall show presently, they are much of the time with no ventilation at all, consequently we may expect to find in them a rare combination of foul gases. Probably the only thing that saves us from a continuous epidemic of typhoid fever, is the fact that our sewage is more diluted with water, in proportion to its volume, than that of any other large city. In the use of water we are extravagant to a degree unknown in any part of Europe, and to this fact I think we may owe such immunity as we have thus far enjoyed from the consequence of our neglect of the proper ventilation of our sewers. Owing to this dilution of our sewage, it is probable that less gas is generated in proportion to the volume of flow than in cities where more attention has been given to this subject: but it is none the less desirable to keep the air of our unventilated sewers from mingling with that of our dwellings. To show how this may be done most economically and effectually, is the object of this paper.

WATER CLOSETS.

When any defects exist in the plumbing system of a house, by which sewer gas can force an inlet, they are usually found most conspicuous in the arrangements of the water closets. It is, therefore, proper that we should direct our notice first to these, as they are the most likely to need the attention of the sanitarian. The requirements of a good water closet are various and imperative. It must be inodorous; it must be so constructed that it can be effectively flushed with a minimum quantity of water; it must be so simple in construction that it is not liable to get out of order in any part, and whatever passes its trap must be effectively prevented from returning in any form. The water closets in common use, however, do not meet these requirements, and it is no exaggeration to say that, when introduced into a house, they are a nuisance and a danger, instead of being a convenience and luxury. From inquiry and observation, I find that the device known as the pan closet is the one most generally used in the inside of New York dwelling houses, while hopper closets, with spring valve flushing apparatus, are chiefly employed in factories and public buildings, and in out-door closets connected with dwelling houses. The common pan closet is probably one of the most objectionable in use. Its construction is so well known that only a brief description will be needed to show its defects. In the drawing marked Fig. 1, B is the basin, usually made of earthenware; P the pan which is tilted by raising the handle; R is the receiver, in

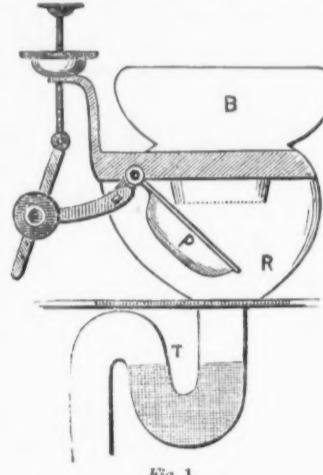


Fig. 1.

which the contents of the pan are deposited when the handle is raised, and T is the trap. The principal objection to this form of closet is that the side of the receiver against which the pan delivers its contents when tilted, becomes coated with a mass of foul matter which clinging to and cakes upon it. I have known instances, occurring under my immediate notice, in which it was necessary to remove the receiver every few months and burn it out, in order to abate for a time the stench, which gradually increased until it became intolerable. The gases generated between the two traps are liberated whenever the pan is tilted, and if this is not frequently done, they make their way through the water in the basin. The defects of this system cannot be effectively remedied by ventilating the receiver, although this may abate the nuisance in a marked degree.

The hopper closet, of which the common type is shown in the drawing marked Fig. 2, is

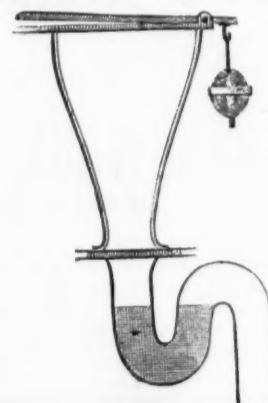


Fig. 2.

better in many respects than the pan closet, and if abundantly and frequently flushed, it is free from any grave objection: but, as the rule, hopper closets are not properly flushed. In most instances a flow, small in volume and with-out force, is maintained by an arrangement which holds the valve partly open when the closet is in use, but this is seldom sufficient to carry fecal matter out of the trap. The pan closets, however, are the ones which especially invite our attention, as they are the ones from which most is to be feared, and against which every physician should utter his protest. If tolerated at all they should receive constant and intelligent attention, and every precaution should be taken to secure a constant and perfect ventilation of the apartment in which they are placed. There is no danger of our being too careful. How little they are feared, however, even by intelligent and well informed people, may well occasion surprise. I know of a house in this city, occupied by an eminent consulting physician, in which the water closets are the worst I ever saw. They are pan closets of the most objectionable kind, placed in dark pantries with absolutely no ventilation, except such as is afforded through the doors opening into the halls, and through windows about the size of a sheet of commercial note paper, opening into adjoining apartments. If intelligent physicians are satisfied with such arrangements as this in the houses they occupy, what can we expect of the general public?

While upon this subject, I may say that it is possible for any one who wants a good water

closet, to get one as free from objections as such an apparatus can be made by the combined study and experience of eminent sanitarians. I do not describe them for two reasons: I have not time, and I do not wish to make any invalid distinctions. I will only say, therefore, that there are water closets in the market, of English and American invention, against which no reasonable objection can be urged, when properly connected with the service and soil pipes. Every intelligent plumber knows which they are, and will provide one if desired to do so. The closet which, from a sanitary point of view, I consider most perfect, is the ship water closet, which, with some modifications, would be a valuable improvement upon anything now in use in dwellings. This is a pump closet, in which a force pump removes everything from the hopper, and forces it out of the soil pipe. These closets are made for use below the water line, so their action has to be made positive, while they are absolutely water and air tight. As applied to vessels, they are quite expensive, but if they could be modified for household use, or a similar apparatus be introduced, there is reason to think that a great benefit to health would result from their employment.

CONNECTING WATER CLOSETS WITH SOIL PIPES.

The manner in which a water closet is connected with the soil pipe is of great importance. The plumber is often responsible for the offensiveness and unwholesomeness of water closets, which, had his work been properly done, would have given little or no trouble. The only effective means of diminishing the danger of an escape of sewer gas into a house, is to afford it an easier means of getting out than through the water in the traps, by ventilating the soil pipe. In common work this pipe generally ends in the highest water closet or wash basin in the house. To prevent the gases from escaping dependence is placed on the traps, the common argument being that the express purpose of the trap is to prevent the escape of gas and foul odors, and if other means are provided they will be superfluous. This argument is based upon an evident misunderstanding of the conditions which sometimes exists in our sewers. In this city there are periods, sometimes several weeks in duration, when, so far as I can learn, our sewers are absolutely without ventilation, and when the only escape for gases, which are often held under considerable pressure, is through soil and waste pipes. Our chief dependence for sewer ventilation is upon the perforations in the manhole covers. These are better than no openings at all, when they are open, but they are liable—almost certain—to become choked with mud and dust during much of the time, and from the first snow fall of winter until spring—with perhaps a few brief intervals of general thaw—they are as effectively closed by ice and snow as they would be if covered over with the permanent pavement of the street. The culverts at the street corners are, of course, trapped, and during the winter season they are effectively sealed, if such a thing is possible under any circumstances. The mouths of the sewers are, as the rule, so placed as to be completely submerged at high tide, at which times the river water forces its way up into them for a considerable distance, compressing the air confined within in proportion to the resistance offered at the various outlets by which it makes its escape. To increase this pressure we have still another active agent—heat. In cold or cool weather the temperature of the air in our sewers is usually considerably above that of the outer air. We are continually pouring great floods of hot water into them at temperatures ranging from 80° to 180° Fahrenheit. It is not unusual to allow steam engines to exhaust into them, and as showing that the temperature of the confined air of sewers is not low enough in average weather to condense steam, I may instance what we have all seen—the escape of steam, still a hot vapor, from the perforations in manhole covers, in regular puffs corresponding to the piston strokes of an engine in some neighboring building. In one way or another we impart a great deal of heat to our sewage, and, under conditions by no means uncommon, this heat is capable of exerting a power so great that no common trap could effectively oppose it. A simple experiment, which I find described in Latham's "Sanitary Engineering," will serve to show how heat exerts its power by increasing the pressure of sewer air upon traps. In the drawing marked Fig. 3 is shown a glass flask with a bent glass tube inserted in the cork—the bend forming a trap which is filled with water. If the hand be placed on the flask, its warmth is sufficient to so expand the air within that the water in the bend of the tube is driven out, leaving the trap unsealed. By partly immersing the flask in cold water, the air within it is so contracted in volume that the pressure of outside air forces the water in the bend of the tube into the flask, also effectually and promptly unsealing it. The air of every waste and soil pipe is subjected during the day to frequent expansions and contractions, which may, and often do, unseal traps. Under these conditions, it is readily seen that when the mouth and manhole ventilators of a sewer are closed, any increase in the volume or temperature of the flow will cause the confined air to struggle for a means of escape, which it usually finds at some trap. Consequently, the trap containing the least depth of water will be the first one in which there will be trouble. To displace a seal altogether, no very great force is necessary. A

three inch seal affords a resistance to the passage of air equal only to a pressure of 2 oz. per square inch. If there is a pipe rising to the roof, and opening there, the pressure is relieved, and there is less danger of sewer gas finding its way into the house, providing the various parts of the apparatus connected with the sewers, soil pipes, etc., are arranged properly in other respects.

CAUSES WHICH UNSEAL TRAPS.

To the pressure from within the sewers, tending to force sewer air into our houses, we may also add the suction of the houses themselves. During the season in which fires are used, and indeed, during the nine months of the year when we live with closed windows, there is a constant outflow of air from the house through the chimneys. The suction thus produced varies greatly under different circumstances. In any case it is enough to cause a great deal of air to enter by a very small opening, and when doors and windows are carefully sealed with list and weather strips, the draft upon the traps may be very considerable. Were the traps empty, a strong inflow of air through the pipes would be thus produced, and with the traps sealed it very effectively supplements the pressure resulting from the causes already noted. I see no reason, however, to apprehend danger from either pressure or suction when the soil pipe is properly ventilated, as shown in Fig. 4.

In trapping pipes there is a good chance for the unskillful plumber to defeat the end he seeks to accomplish. My attention was lately called to a house occupied by a friend, in which the faint, depressing odor always noticeable in the bath room and adjoining apartments, revealed the presence of sewer gas. A thorough examination of the plumbing work was made, which revealed certain defects only too frequently met with in private dwellings. In the bath room there was a common tub, basin, etc., after the usual practice. A careful examination showed that the waste pipe from the bath tub was connected with the soil pipe of the closet below the trap, consequently, the air from the sewer escaped into the room. Closing this opening was of no use, however, until the basin waste was also closed, when there was a slight improvement; but sewer gas continued to escape through the overflow pipes, which were without traps and connected in the usual manner, and which could not be tightly closed. This was, of course, a case of gross neglect, carelessness, or ignorance on the part of the plumber. If the overflow and waste pipes were to be carried into the soil pipe below the trap, they should also have been provided with traps, for otherwise the sewer is practically opened into the house. Though this arrangement of pipes is about as bad as it could be, it is by no means uncommon. In another instance, when inspecting a very costly job of plumbing in a Western city, I found that an attempt had been made to form a stench trap in each of the waste pipes, both from bath tubs and basins, but the plumber, apparently ignorant of the action of the trap, had, in several instances, after bending his pipe, set it up at such an angle that the water remaining in the trap would hardly fill the pipe, while in other cases the bends were so long and so nearly horizontal that the force of the water would nearly empty them, and leave a passage for air above it. In most cases of defective trap arrangements which have come under my notice, it is but just to say that the fault lay wholly with the plumbers. The pipes were improperly placed, the traps set up wrong, or the work in some way "botched" in putting it together. This shows the danger of entrusting plumbing work to incompetent, ignorant or careless workmen, when any connection is to be opened between the sewers and the inside of a house. Fortunately for many so-called practical plumbers, but unfortunately for the public health, comparatively few persons know whether the work for which they pay is done properly or not, especially when it is so placed as to be difficult of access; but when the presence of sewer gas is detected, and the cause of its presence is unknown, it would, in every case, be a judicious economy to employ an expert to discover and remedy the defect at any cost.

(To be continued.)

New Type of Coke Ovens.

The coke ovens at Almond Iron Works, near Falkirk, N. B., are described as follows, by Mr. Henry Aitken: The novelty of this new type of ovens consists in forcing either heated or cold air into the space above the upper surface of the materials being coked, so as to burn the gases and promote the coking process. The following is the working of these ovens as described by Mr. Aitken: When the oven has been properly dried and heated, it is charged either through the doorway or the outlet for the gases, and as soon as the heat has evolved and ignited sufficient gas, the blast is turned on and the air forced in through air holes, and the blast is continued and regulated so long as gas comes from the coal, the outlet for the gases being partially closed, and the air being regulated so that the mixture of gas and air, will near the end of the charge, shall always have in it unconsumed carbon. The quantity of air required is always largest at the beginning of the charge, gradually diminishing to the close. So soon as the gas is all evolved the coke is either allowed to cool down or is watered out and drawn.

The writer next stated the results, first with the new arrangement applied to the ordinary Beehive ovens, and next to horizontal through and through ovens. In the first the average charge put into the ovens was 3 tons 4 cwt. of coal, and the average time from charge to discharge sixty-two hours. With the same coal in ordinary Beehive ovens, the time required is eighty hours. The time varied, however, according to the nature of the coals. The quality of the coke produced is pronounced by all the parties who have seen it to be first-class

—equal to any made from the Beehive oven. The weighing was done with the greatest care, and with the exception of Blackbrase, the weights were checked by representatives of the parties whose coal was being coked, and may be depended upon as correct. The losses with Melburn coal and Biunehill soft are exceptionally high, owing to the large amount of dirt in them, causing a great quantity of breezes. The results from the application to the horizontal oven No. 2 was equally good, and the amount of breezes less. The quality was even superior. At present the oven was drawn by crane in the old-fashioned way, but it was proposed to take it out with a large shovel, with or without sides, worked by a steam engine or hydraulic machinery. As the coal in coking shrinks about an inch from each side of the oven, it was thought no difficulty will arise in working in this way. The coal was also to be charged by machinery.

It will be seen, continued the writer, from the novelty adopted in these ovens that the temperature maintained is very high, and that the gases as they leave the oven not being charged with a great quantity of air can be utilized either for heating the air or for driving the fans of the blast. Even after this is done there should be a large surplus of available heat. With most coals, particularly those of a dull semi-cooking or partly burnt nature, hot blast is to be preferred, but with a quick coal cold blast does equally well. Although the ovens are subjected to a high heat, it is not found that the brick work suffers. There being almost no waste of coke, and therefore, almost no ashes formed, there is no fluxing of the brick work with the iron, lime, &c., of the ashes as in ordinary ovens. Few coals have more tar in them than is required to make good coke, but where such a coal is made into coke these tars may be drawn off by a pipe or pipes at the bottom of the oven, the gas exit being partially closed, and thereby creating pressure sufficient to force the gases through the pipes. Several pailsful of tar and ammoniacal water have in some cases been taken from a single oven, but the quality of the coke has always suffered. Owing to the high heat got in these ovens, coal that could never be coked before had been converted into good coke. The Pleasant Coal Company, near Stirling, has four ovens of their No. 2 coal tried, from which they never had been able to make coke, and the result was 60 per cent. of very fine coke. With these ovens the coke may be watered out as in an ordinary Beehive oven, and in this respect are unlike all descriptions of fluid ovens where the gases are burnt in chambers separate from the coal. The only extra expense that would be incurred in adopting this novelty is the cost of the pipes, fan and engine. It is thought that one man could attend to the fans and engine and the regulation of air to 100 ovens.

Post Offices on Wheels.

Three cars, styled the Palace Drawing Room Postal Cars of New England, have just been completed at Allston for the Boston and Albany Railroad Company. They are 60 feet in length, the longest on the road, are constructed of the choicest materials, and finished in hard wood in natural colors, and are provided with all the modern improvements ingenuity could suggest. A large and novel lamp, manufactured by the company, and having four burners and four reflectors, is suspended from the roof of each car, giving ample light. About 20 feet of each car is partitioned as a store room for through mails, while the remaining space is divided into sections devoted to different purposes. The section in the middle is intended for letter sorting, another section is specially designed as a newspaper department, and still another section is used as a receptacle for bags, and is provided with racks, hooks, and other conveniences for facilitating the making up of the mails. Each car is provided with water tanks and set bowls similar to those in palace passenger cars. In the letter department of each car are 470 boxes with wire netting bottoms, which prevent the accumulation of dust, while the newspaper department of each has 27 boxes, and the whole are labeled with the names of postal stations, and the principal postal routes in the country. When leaving Boston, these cars each require four clerks or route agents, but when returning to Boston, only two clerks are requisite. These cars make runs of 400 miles a day, but the postal clerks only run half that distance a day.

Improved Railway Axle Boxes.

Mr. C. A. Hussey, of this city, has patented an improved plan to prevent dust and sand from getting into railway axle boxes. This is accomplished by means of leather packing, arranged to form a tight connection from the box against the wheel, so that the lubricating fluid may be poured into the box, to allow the journal to run in oil. The invention does away with the old dust plate and the cotton waste packed in beneath the journal. The axle box is made shorter, smaller, and consequently lighter and cheaper than the common box, and it accomplishes the object in the most perfect manner, and it is the complete protection of the journal and its consequent protection from heating and wearing. Mr. Hussey has also another invention, which is an improved method of preserving the journals and brasses of railroad axle bearings from heating and wearing. This is accomplished by producing a circulation of water or other liquid through the brass or box, which receives all the friction of the journal. The brass of the axle is chambered out in any suitable manner, and elastic tubes are connected therewith for conducting and discharging the water to and from the brass. A lively current of water is produced from an elevated reservoir, which keeps the brass and journal at a low temperature. The ordinary absorbent, cotton waste, may be used in axle boxes having this cooling current applied to the brasses, with safety from heating and wearing.

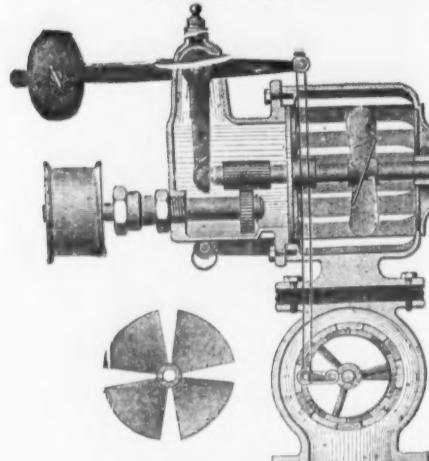
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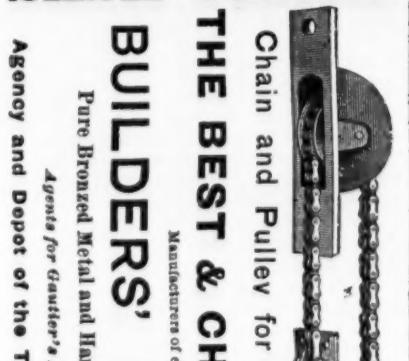
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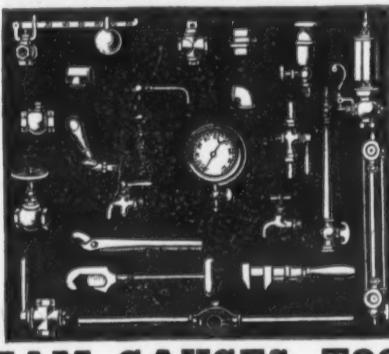
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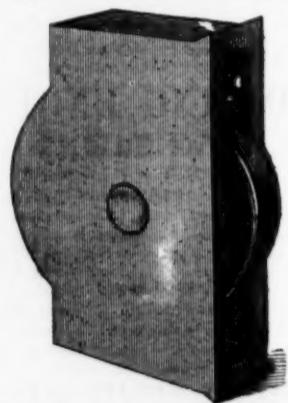
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The Coal and Iron Trade of the Mahoning Valley.

From an interesting pamphlet on the past and present of Youngstown, Ohio, we take the following:

COAL TRADE.

The coal fields of Ohio are second in importance only to the great coal fields of Pennsylvania, and comprise an area of 10,000 square miles, or 6,500,000 acres. The estimated yield of twenty-seven cubic feet to the ton would give the coal deposits in Ohio, as here estimated, to be 209,733,334 tons. It would require 51,200 years to exhaust these mines, were they operated at the same rate they are now being mined; or it would supply the entire demand at present made upon the colliers of the United States for 4500 years; or it would supply Great Britain with coal for 1600 years, with a production equal to that mined at the present time. From a volume entitled "Coal Regions of America," we find the following brief outline of the coal seam in Ohio.

"The coal basin is bounded on the west by a continuous but eroded line from the Ohio River, in Scioto county, to the Pennsylvania line near Sharon, within a line running from that place to Ravenna, Akron, Wooster, Dover, Brownsville, Logan and Hanging Rock. Or, to follow the line of outcrop more particularly, we have in the north, in Trumbull county, the boundary of the coal field from where the Pymatuning Creek crosses the State line, curving southward, and the other side of the curve being on Mahoning Creek at Youngstown. Thence the line is westward nearly along the north line of Mahoning county, from the northwest corner of which it puts out a long, slender cape through Portage into Geauga county, its west boundary being near the Cuyahoga River, until it enters Summit county. From Ravenna the line is nearly south-west to the north line of Holmes county, except a well-defined cape running into the southeast corner of Medina county. Thence southward it follows near the east line of Holmes and Knox counties, and includes the southeast corner of Licking county. It then passes near the line between Fairfield and Perry counties, with a deep indentation at the Hocking River valley, extending to the west line of Athens county; thence westward and south-west to include the south-east part of Hocking county, three-fourths of Clinton, nearly all of Jackson, and the eastern part of Scioto counties. The counties wholly covered with coal are Mahoning, Columbiana, Stark, Holmes, Tuscarawas, Carroll, Jefferson, Harrison, Belmont, Guernsey, Coshocton, Muskingum, Perry, Noble, Morgan, Monroe, Washington, Athens, Meigs, Gallia, Lawrence, and nearly all of Jackson. All the counties of which the eastern or south-eastern parts only are covered with coal are Trumbull, Portage, Summit, Medina, Wayne, Licking, Fairfield, Hocking, Vinton and Scioto. There are also some outliers or small detached basins in Wayne, Ashland, Richland and Knox counties."

The discovery of mineral coal and its uses is an event of the present century. Coal was known to exist at various points in Northern Ohio when the forest was first penetrated by the early settlers. The first coal mining in Northern Ohio was done about the year 1810. The coal was dug from a pit near Talmage, in Summit county, and used for many years for blacksmithing purposes. About the year 1819 or 1820 Mr. Asaph Whittlesey and Samuel Newton opened a bank near that place, which was followed, a few years later, by the opening of other mines. The coal as yet had never been tested for heating purposes, and aside from blacksmiths, there was no demand. Coal was known to exist by the settlers in the Mahoning Valley, and as the country became more thickly settled, and wood began to be more scarce, coal was taken from the out-crops and used by blacksmiths, and also for fuel; a more systematic method of mining was soon adopted, and coal was taken in large quantities to other places. In 1840, David Tod was operating a mine at Brier Hill, and upon the completion of the Pennsylvania and Ohio Canal from Akron, Ohio, to Beaver, Pa., he shipped a couple of boat loads to Cleveland for the purpose of introducing it as fuel on lake steamers, which was not easily accomplished, there being considerable hostility manifested toward it by engineers and firemen. Mr. Tod, however, was not to be discouraged by these difficulties, and finally succeeded in making a successful experiment; and in 1845 coal supplanted wood on the steamers on the lower lakes. Large quantities were subsequently mined and shipped to Cleveland from the Mahoning Valley by Mr. Tod, and but a few years elapsed until the mining and shipping of coal became a prominent industry; later, the opening of the Cleveland and Mahoning Railway from Cleveland to Youngstown, traversing the heart of the coal region, gave fresh impetus to the mining interests.

The discovery that the coal in the Mahoning valley could be used in reducing ores without coking was the result of mere accident, in the year 1845; and then the iron made from the use of the raw coal proved to be of a superior quality to that produced by the use of coke. This discovery was of incalculable benefit, both to coal operators and iron manufacturers, and extensive operations were soon entered into for the mining and shipping of coal, and the erection of manufacturing establishments, which consumed large quantities at home in manufacturing iron and its products. The State geologist, in his report of the geological survey of Ohio, says: "The coal of the Mahoning Valley, nearly all of which is a first-class coal, superior to that from any other coal field in the State, and not excelled by any bituminous coal mines anywhere."

"The coal is generally remarkably free from sulphur and other impurities, containing a small per cent. of ash and a large per cent. of fixed carbon. As the analyses of specimens taken from various openings, and published in the chemist's report, will show, it is generally a dry, open burning coal, its mechanical structure causing it to take fire rapidly through the center of the largest pieces, especially adapting it to the smelting of iron.

"The coals in this valley were the first bituminous coals mined in the country for the reduction of iron ores without coking, a fact which made them widely known, and gave them at the time a reputation above all other bituminous coals. Notwithstanding continuous explorations have largely increased our knowledge of the coals of the country, and have brought to notice of manufacturers many varieties of great excellence, these still maintain the reputation thus acquired. They are still the standard with which iron making coals are to be compared."

The coal mines in the Mahoning Valley are principally located in the townships of Brookfield, Liberty, Vienna, Hubbard, Weathersfield and Houlton, in Trumbull county, and Austin, Youngstown and Colteville townships, in Mahoning county. In our exhibit of the coal trade in this region, we had hoped to give a complete report. In this, however, we are somewhat disappointed, as there are some mines in operation from which we could get no statistics. Below we give reports from works located contiguous to Youngstown, and, as great care was used in gathering the data, it may be considered a fair report. The total number of men employed in these mines is 3480, to whom are paid for labor \$1,821,486 per annum. There were 507,375 tons of coal mined in 1873, employing a capital of \$1,670,000. The number of acres of coal land being worked 6680, which is valued at nearly \$5,000,000.

The coal basin is bounded on the west by a continuous but eroded line from the Ohio River, in Scioto county, to the Pennsylvania line near Sharon, within a line running from that place to Ravenna, Akron, Wooster, Dover, Brownsville, Logan and Hanging Rock. Or, to follow the line of outcrop more particularly, we have in the north, in Trumbull county, the boundary of the coal field from where the Pymatuning Creek crosses the State line, curving southward, and the other side of the curve being on Mahoning Creek at Youngstown. Thence the line is westward nearly along the north line of Mahoning county, from the northwest corner of which it puts out a long, slender cape through Portage into Geauga county, its west boundary being near the Cuyahoga River, until it enters Summit county. From Ravenna the line is nearly south-west to the north line of Holmes county, except a well-defined cape running into the southeast corner of Medina county. Thence southward it follows near the east line of Holmes and Knox counties, and includes the southeast corner of Licking county. It then passes near the line between Fairfield and Perry counties, with a deep indentation at the Hocking River valley, extending to the west line of Athens county; thence westward and south-west to include the south-east part of Hocking county, three-fourths of Clinton, nearly all of Jackson, and the eastern part of Scioto counties. The counties wholly covered with coal are Mahoning, Columbiana, Stark, Holmes, Tuscarawas, Carroll, Jefferson, Harrison, Belmont, Guernsey, Coshocton, Muskingum, Perry, Noble, Morgan, Monroe, Washington, Athens, Meigs, Gallia, Lawrence, and nearly all of Jackson. All the counties of which the eastern or south-eastern parts only are covered with coal are Trumbull, Portage, Summit, Medina, Wayne, Licking, Fairfield, Hocking, Vinton and Scioto. There are also some outliers or small detached basins in Wayne, Ashland, Richland and Knox counties."

The enterprising settlers of the Western Reserve were also the pioneers of the iron business of this State. Clevelin, Montgomery & Mackay, of Youngstown, built the first furnace in Ohio, at the mouth of Yellow Creek, on the Mahoning, in 1808, within ten years after the settlement of this region. Before that time all the castings and all the bar iron required on the Reserve was, like the grindstones, brought from great distances, at a heavy expense. Iron was almost a precious metal. This establishment was what is called among iron masters a "pocket furnace," eight feet across the boshes, and about 30 feet high. It stood like all the old furnaces against a bluff, and was charged over a bridge built from the bank to the top of the stack. Its ruins are still visible a short distance below the Mt. Nebo mine. It was, of course, a charcoal furnace, with cold blast, driven by water-power, producing only a ton and a half to two tons per day. In 1809, James Heaton built a refining forge on Musquodero Creek, where is now the prosperous village of Niles, in Trumbull county, for the manufacture of bar iron with charcoal, and also built another on the same creek, at the falls, two or three miles above. Thirty years afterward the business of making iron with bituminous coal in a raw state, in the United States, originated in this vicinity. The history of this great industry is worthy of attention. About 1815, Aaron Norton, of Middlebury, near Akron, put a charcoal furnace in blast, using a water-power half a mile above the village. In 1819, Asaph Whittlesey built a forge on the Little Cuyahoga, a mile and a half below Middlebury, where the present railways cross that stream.

The new business soon began to develop rapidly in the Lake Shore region. Along the northern slopes of the sand ridges, which lie near to and parallel with the shore, are frequent beds and bunches of bog iron ore, deposited from springs that issue from the ridges. It is a lean ore of about 25 per cent., but makes a soft and valuable metal, especially for castings. Most of it was run into stoves, kettles and other hollow ware for domestic uses. These establishments are now in ruins, and their localities have passed from the public remembrance. As most of their proprietors needed capital, and however energetic they may have been, most of them were unfortunate in the results. We will do something to preserve their memories, by inserting a condensed abstract of the owners and situations of the old charcoal furnaces of the Reserve. They were not then, as iron works are now, a presage of personal wealth and position. With the pioneer iron men it was an experience of toll, perplexity and risk, that more often ended in pecuniary ruin:

**STATEMENT OF THE EARLY COLD BLAST FURNACES
AND FORGES OF THE WESTERN RESERVE, OHIO,
WITH THE DATE OF ERECTION, LOCATION,
NAMES OF BUILDERS AND OWNERS, AND WHEN
ABANDONED.**

(Prepared by Col. Whittlesey, of Cleveland, for J. Wiggins' "Cleveland as It Is.")

1805—Yellow Creek, Trumbull county, Mackay, Montgomery & Clevelin.

1809—Musquodero Creek (forge), Niles, Trumbull county, James Heaton—1845.

1812—Yellow Creek Falls, Dan Eaton & Sons—1833.

1816—Middlebury, Portage county, Aaron Norton—1842.

1819—Little Cuyahoga (forge), Asaph Whittlesey—1850.

1824—Geauga Furnace, Painesville, Incorporated Company, in operation till recently.

1825—Concord, Lake county, Root & Wheeler.

1825—Madison, Lake county, Clyde Company—1838.

1832—Lorain, Lorain county, Herman Ely—1835.

1832—Conneaut, not known—not known.

1832—Elyria (forge), Norton & Barnum—not known.

1834—Dover, Cuyahoga county, Barber & Hoyt.

Cuyahoga Steam Furnace Company—run until recently.
1834—Florence, Huron county, Ford, Wilkinson & Co.—1840.
1835—Mill Creek, near Youngstown, not known
1835—1850.
1835—Middlebury, Cuyahoga county, near Bersa, D. Griffith & Co.—1850.

1840—Akron, Ford, Tod & Rhodes—1855.

1840—Valley Forge, below Cuyahoga Falls, D. J. Garrett & Co.—1845.

In July, 1845, Himrod & Vincent, of Mercer county, Pa., blew in the Clay Furnace, not many miles from the Ohio line, on the waters of the Shenango. About three months afterward, in consequence of a short supply of charcoal, as stated by Mr. Davis, their founder, a portion of coke was used to charge the furnace. Their coals belong to seam No. 1, the seam which is now used at Sharon and Youngstown, in its raw state, variously known as "Free Burning Split" or "Block Coal" and which never makes solid coke. A difficulty soon occurred with the cokers, and, as Mr. Himrod states, he conceived the plan of trying his coal without coking. The furnace continued to work well, and to produce a fair quality of metal.

At the same time Messrs. Wilkinson, Wilkes & Co. were building a furnace on the Mahoning, at Lowell, Mahoning county, Ohio, intended to use mineral coal from seam No. 1, on which they owned a mine near Lowell.

A sharp correspondence occurred in 1849 between the partisans of the Clay furnace and those of the Lowell furnace, as to their priority in the use of raw coal. The credit of making the first iron with raw bituminous or semi-bituminous coal, in the United States, belongs to one of these firms. An account of the blowing in of the Lowell Furnace, on the 8th of August, 1846, may be seen in the *Trumbull Democrat*, of Warren, dated August 15, 1846, where it is stated that "these gentlemen (Wilkinson, Wilkes & Co.) belongs the honor of being the first persons in the United States who have succeeded in putting a furnace in blast with raw bituminous coal." According to Mr. Wilkes, writing from Painesville, April 2, 1869, this furnace was run with coke several months, but at what time it does not state. It is admitted that Mr. David Himrod, late of Youngstown, produced the first metal with raw coal, about the close of the year 1845, and has continued to use it ever since. The friends of Wilkinson & Co. claim that it was an accident and a necessity, while their works were built and intended for raw coal.

Our exhibit of the coal trade in the Mahoning Valley, establishes the fact that this mineral is to be found here in inexhaustible quantities. And our theory that ores can be brought to the coal and made into iron, and iron manufactured into its various uses, at a greater advantage than by transporting the coal to iron, is also an undisputed fact; but in order to satisfy the credulous, and to obviate any possible chance of contradiction, and the appearance of partiality in our arguments, we have compiled the following table, showing the number and the names of the furnaces now in operation in the valley, using this fuel in the manufacture of pig iron, with the date of their establishment and their location:</

Petroleum and Gas in Ohio.

The Pittsburgh *Commercial* says: From Mr. Richard Carter, of 232 Liberty street, this city, we learn the particulars of a discovery of petroleum and petroleum gas at Sciotoville, Ohio, on the grounds of the Scioto Fire Brick Company. It seems that in January, 1820, two men, John Brown, Sr., and David Jones, bought a strip of 12 acres of land on the bank of the Ohio River, near the site of the present village of Sciotoville. Mr. Jones was a practical man, and it occurred to him that on this land salt water might be found. He commenced digging a well, with the appliances of that day, and after sinking it to a depth of 75 feet, walled it with sawed trunks of hollow sycamore, and then by the slow and laborious process of that time, he drilled to the depth of 350 feet, tubing with wood and tin tubes of about two and one-half to three inches in diameter. He struck salt water, said to be so strong that a spoonful of salt would be insoluble in a pint of water, but the flow was weak, and was hindered by a strong flow of petroleum and a steady press of gas. Not knowing the value of his discovery, and being financially unable to prospect further, he abandoned the well, closing the tubing with a heavy pine plug, nearly three inches in diameter. The pressure of the gas was so strong, that a half-inch hole was made through the plug, so it could be driven in, and then a smaller plug driven in that. Moving on his farm, he set to work to earn means to continue boring his well, but before he could do so he sickened and died, salt dropped down to 15 cents per bushel, and his heirs never took up the unfinished work that he had abandoned.

The oil and gas bubbled up, but nobody knew their value, and the well attracted no attention further than that the petroleum was used by the natives to rub on their sprained, bruised or rheumatic limbs, and both petroleum and gas were fired by wondering groups of men and boys as they bubbled up on the Ohio River, which, in the years since 1820, had cut away the bank and spread its waters over the well. The uninformed wondered what manner of thing this was that ignited at the touch of a match, and was carried on by the waters, and island of flame.

But it is now to be turned to account. The land changed hands until the Scioto Fire Brick Company came into possession of it, in 1872, and the president of the company, Mr. W. Q. Adams, concluded recently to reopen the well, and did so, and when the end of the tubing was reached and the plug removed, petroleum flowed faster than a man could bail it out with a bucket, while the pressure of gas was very strong. A long iron tube was lowered and loosely inserted in the tubing, and when a match was applied at the top of the iron pipe, the gas was ignited and burned with a steady flame, while a piece of burning paper was communicated to the oil on the water, and the whole surface was soon ablaze.

With such favorable indications, the company at once set about to utilize this gas, and as the old well is only about 20 feet above low water mark, the idea of using the well was abandoned, and the company began digging a well on the bank near their lower brick yard, and have reached the rock, engaged a practical well digger, are preparing their derrick, and will begin boring as soon as the river opens, using the power from their engine in the works.

If the company find gas, as they no doubt will, it will enable them to run their entire works with gas, light the work and store, and make an immense saving in the way of fuel.

Should the old well be utilized, as it can be done, the flow of petroleum may be such as to make the village of Sciotoville one of the most important in Southern Ohio. It has extensive coal fields within 12 miles of the corporate limits; rich beds of ore as near; the best fire clay within a stone's throw of the place, and if it has petroleum and gas hidden under its walks and avenues, the broad sweeping river on its south, and a railroad running through it, will widen its borders, extend its domains, dot its squares with iron works, its hills with furnaces and its valleys with derricks.

The Blair Iron and Steel Company are erecting an additional furnace, which will be completed probably by the 1st of April, when the capacity of the works will be increased from 24 tons of steel per week to 90 tons per week. The demand for the product of this mill has become so great that this increase in the facilities was absolutely necessary. As soon as the improvements are completed, the mill will be run to its full capacity.

Special Notices.

DISCOUNT LISTS.

Screws, 20 to 60¢; Bolts, 25 to 80¢; Files and Rasp, \$3.50 to \$8.50 to the £. Complete for \$1.00.

DAYTON & LAMBERTON, 101 & 103 Duane St., N. Y.

Wanted.

A superintendent of experience capable of taking charge of a Malleable Iron Works.

Address
ST. LOUIS MALLEABLE IRON CO.,
2116 Market Street, St. Louis, Mo.

The managing partner of a Retail Hardware House doing a business of one hundred thousand yearly, is about to retire from the firm, and would accept a situation as traveling salesman for a first-class manufacturing or jobbing establishment, with route west of Chicago.

References first-class. Ready April 1st.

Address
" CALIFORNIA,"
Office of *The Iron Age*,
No. 10 Warren Street, N. Y.

Special Notices.

THE CHATTANOOGA
Foundry and Machine
WORKS,
Mining & Manufacturing Co.

(Late WEBSTER & MARKS and THOS. WEBSTER,
Chattanooga, Tenn.)

Incorporated under a charter granted by the State of Tennessee: Capital, \$50,000, in 5000 shares of \$100 each, with power to increase to \$1,000,000. Subscribed Capital \$150,000 in 1500 shares of \$100, each, fully paid up.

This Company is formed for the purpose of acquiring and extending the established business and works of Webster & Marks, well known as Thomas Webster's Foundry and Machine Works, situated at Chattanooga, Tennessee, established in 1857, for building every description of Foundry, Mechanical and Engineering requirements, and for the purpose of purchasing or leasing mineral lands and erecting works thereon.

The Works are substantially erected on about five acres of land, all of which is freehold, and are situated in a most eligible position for making all kinds of Castings and Machinery, in the center of the Coal, Iron and Mining districts of Tennessee, Georgia and Alabama, and surrounded by at least twenty Pig Iron Furnaces in those States. They are located above high water in the center of the city, and connected by a side track with all the lines of Railroad centering in Chattanooga.

These Works have been most successfully carried on by Mr. Thomas Webster, are in full operation, and comprise a large and well equipped Foundry, connected with the Machine Shop by a narrow-gauge track, and contain one of Scott's English Patent Gear Wheel Molding Machines. The Machine Shop, the largest in the entire South, is fully equipped with the best and most modern improved machinery, consisting of Lathes, Planers, Forging Mill, Drill Press &c. The Pattern Shop is fitted up with all the necessary Tools and Machinery for making Pattern &c. The large Blacksmith and Boiler Shops are fully equipped.

The stock on hand is of recent purchase, and all in good working condition. There is also a large and valuable amount of patterns for furnace and mining machinery, peculiarly adapted to this country, and for the building of Narrow-Gauge Locomotives. The Works are well supplied with orders, and the opening and development of new Iron Ore deposits and other mineral properties in the neighboring country, with a rapidly increasing population, combine to increase the demand for machinery of all descriptions.

The Works will be transferred to the new Company in full working condition, with all beneficial contracts, and will include the whole of the land and buildings thereon, together with the modern and valuable Plant, Machinery, Fixtures, Siding and good will.

The contract price of the Works to the Company will be \$120,000; \$50,000 in cash and \$70,000 in 700 ordinary shares of \$100 each, fully paid up.

The estimate on which this sum is based is from a carefully made valuation of freehold land, buildings, machinery, plant, patterns, fixtures, siding and good will.

The Directors and Officers of this Company will be appointed at the first meeting of the stockholders, of which due notice will be given.

Prospectus, copy of charter and forms of applications for shares may be procured from the Secretary pro tem, at the offices of the Company at the Works. Each application for shares must be accompanied by a payment of \$10 per share on application.

Should no allotment be made the deposit will be returned without deduction.

[Here follows the charter, which is very full in its grant of manufacturing and mining franchises].

Opinion of Counsel upon Validity of Charter.

[Copy]. CHATTANOOGA, TENN., Jan. 19, 1875. THOMAS WEBSTER—Sir: We have examined the accompanying copy of charter of "The Chattanooga Foundry and Machine Works, Mining and Manufacturing Company," with a view to ascertain its validity, &c., and have come to the conclusion that the charter was regularly obtained and is legal. Under it the company or corporation may safely organize and invest their money or other capital. All the powers enumerated in said charter are consistent with the Constitution of the United States and of the State of Tennessee; and they would be enforced in the courts of the country in law and in equity.

Respectfully, [Signed].

TREWHITT, GASKILL & TREWHITT, Atty's.

Prospectus and forms of application for Shares can also be procured from

GRIGGS & CARLETON,
Financial and Business Brokers,
98 Broadway, New York.

Wanted.

A salesman who is acquainted with the Hardware and Furniture trade, and with manufacturers generally, by a large wholesale manufacturing house. None but first-class men, well recommended, need apply. Address, giving nationality, salary expected and age,

J. Z. S. & Co.,
P. O. Box 4041, New York.

TO MANUFACTURERS

of Am. Pocket & Table Cutlery, Files, Saws, Curry Combs, &c., &c.

A New York Hardware and Importing House, canvassing the principal cities of the Western and Southern States, desire the services of securing the sole agent to represent a manufacturer of American Pocket & Table Cutlery, Files, Saws, Curry Combs, &c., &c. Address, A. B. Box 2738, New York, P. O.

WANTED, IMMEDIATELY.

A Hardware Store, consisting of a stock of Builders' and Manufacturers' Hardware (no stove or tile ware wanted), between 42 north and 37 degrees south latitude, in the City of Mobile, Alabama. Also, fixtures, one window, &c. Address, J. H. H. Box 1633, Binghamton, N. Y.

Reference first-class. Ready April 1st.

Address
" CALIFORNIA,"

Office of *The Iron Age*,

No. 10 Warren Street, N. Y.

Special Notices.

Special Notices.

\$ 85,000

Will Purchase the Controlling Interest in an Established Manufacturing Company, situated in New England. A splendid chance for a business man or for investment.

Address, in first instance, CONTROL,
Office of *The Iron Age*, 10 Warren St., N. Y.

OFFICE OF H. A. ROGERS, 19 JOHN St.,
New York, January 23d, 1875.

The Firm of H. A. ROGERS & CO., 50 and 52

John Street, is this day dissolved by mutual con-

sent. H. A. Rogers retiring.

NEW YORK, January 18, 1875.

In calling your attention to the above notice, I beg to say that I will continue business in my own name and for my own account at No 19 John Street, where may be found a complete stock of Railway, Mill and Machinist's Supplies.

H. A. ROGERS.

Engineering engagement desired by an engineer, accustomed to the computation of strains in structures, and to the use of all varieties of engineering instruments, of experience in testing the strength of materials, and recently Assistant Inspector for the Illinois and St. Louis Bridge Co. Would take charge of a drafting room, or of construction. Bridging preferred. Address C. S. D.,
Drawer 9, Wolcott, N. Y.

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Engineering

Trade Report.

Office of THE IRON AGE.

WEDNESDAY EVENING, March 17, 1875.

The past week has witnessed considerable speculative activity in Wall street, resulting from the operations of a bull clique in the stock market and a bull clique in the gold market. As the gold clique could not succeed except by locking up gold, demoralizing stocks, and depressing the prices of securities, the result of the conflict of operations has been a lively activity, in which neither side has gained much or lost much. Money has been easy, and although at times an advance has seemed imminent as the result of a movement to lock up currency, the locking up operations were confined to gold. Call loans averaged 3 @ 4 per cent, with 2 and 7 as the exceptional rates. Prime mercantile paper has been discounted at 5 @ 7 per cent.

The gold market has been strong, and the premium has been as high as 11 1/2, with 1 1/2 per cent. per day to borrowers. The following shows the daily range of the premium:

	Interest	Lowest	Highest
Thursday.	11 1/2	11 1/2	11 1/2
Friday.	11 1/2	11 1/2	11 1/2
Saturday.	11 1/2	11 1/2	11 1/2
Monday.	11 1/2	11 1/2	11 1/2
Tuesday.	11 1/2	11 1/2	11 1/2
Wednesday.	11 1/2	11 1/2	11 1/2

The stock market has been much excited at times and strong throughout. The principal speculation has been in Lake Shore, Union Pacific, Western Union, Northwestern, Pacific Mail and Ohio & Mississippi. The highest and lowest of to-day's quotations for active shares are given below.

Government bonds were dull until the Treasury policy was defined, when they became active and strong. As announced in our last issue, Secretary Bristow issued on Thursday his call for \$30,000,000 of 5-20s—\$5,936,250 registered, and the remainder coupon issues. The \$5,936,250 registered bonds called are all held in this country, and the gold paid out to redeem them will be so much added to our bank reserves, available as a basis of credit. How many of the \$24,063,750 coupon bonds are held abroad is not known. The *Evening Post* says: "Some of the bankers estimate that not more than \$5,000,000 are here, while others are confident that as many as \$12,000,000 are here. If we take the average of the two estimates—\$8,500,000—it will leave \$15,563,750 on Europe, or about one-half the entire call. This calculation would add to the stock of gold in this market during the next ninety days about \$15,000,000, and would, provided Europe takes none of our securities within the next ninety days, involve the export of about \$15,000,000; so that really at the worst the gold market would be little affected by the call, and the clique would have the same control over it as of late. But it is not fair to assume that Europe will take none of our securities during the next ninety days. The syndicate are confident that they can sell a large amount of new fives there, some of the members claiming that for every 5-20 6 per cent. withdrawn from Europe a new five of equal amount will be sent there. If this is so, foreign exchange will not be effected, and no gold will be shipped on account of the call.

The following tables show the foreign trade movements for the week:

	Imports.	Exports.	Trade.
Total for week.	1873.	1874.	1875.
Total for week.	\$5,974,503	\$9,93,006	\$7,223,855
Prev. reported.	\$2,475,621	70,686,452	66,829,911
Since Jan. 1.	\$88,450,214	\$80,593,548	\$74,053,766

Among the imports of general merchandise were goods valued as follows:

	Quant.	Value.
Brass goods.	19	\$6,372
Bismuth.	1	621
Bronzes.	16	4,696
Chains and anchors.	93	3,675
Cutter.	134	44,608
Guns.	105	12,342
Hardware.	103	7,132
Iron, pig, tons.	300	6,474
Iron, cotton ties.	808	2,393
Iron, other, tons.	23	1,993
Iron ore, tons.	172	2,781
Lead, pigs.	114	2,781
Lead, wire.	224	23,896
Nails.	2	154
Needles.	18	11,930
Per caps.	6	1,154
Saddlery.	7	1,579
Steel.	3,663	33,490
Silverware.	403	403
Tin, boxes.	6,46	282,672
Tin (260 slabs).	27,057	5,767
Wire.	32	3,151
Zinc.	34,312	1,605

EXPORTS, EXCLUSIVE OF SPECIE.

	1873.	1874.	1875.
For the week.	\$5,974,503	\$9,93,006	\$7,223,855
Prev. reported.	\$2,475,621	70,686,452	66,829,911
Since Jan. 1.	\$88,450,214	\$80,593,548	\$74,053,766

The following are the highest and lowest prices of stocks to-day:

	Bid.	Asked.
U. S. Currency 6's.	119 1/2	119 1/2
C. S. 6s 1881, reg.	119 1/2	120
U. S. 5-20 1863, 100.	121	121
U. S. 5-20 1863, 5-20 reg.	117	117
U. S. 5-20 1864, com.	117 1/2	—
U. S. 5-20 1864, reg.	117 1/2	118
U. S. 5-20 1864, com.	118	118 1/2
U. S. 5-20 1865, reg.	118 1/2	119
U. S. 5-20 1865, com.	119 1/2	120
U. S. 5-20 1865, reg. now.	118 1/2	118 1/2
U. S. 5-20 1865, com.	119 1/2	119 1/2
U. S. 5-20 1867, reg.	119 1/2	119 1/2
U. S. 5-20 1867, com.	119 1/2	120
U. S. 5-20 1868, reg.	119 1/2	119 1/2
U. S. 5-20 1868, com.	119 1/2	120
U. S. 5-20 1869, reg.	119 1/2	119 1/2
U. S. 5-20 1869, com.	119 1/2	120
U. S. 5-20 1870, reg.	119 1/2	119 1/2
U. S. 5-20 1870, com.	119 1/2	120
U. S. 5-20 1871, reg.	119 1/2	119 1/2
U. S. 5-20 1871, com.	119 1/2	120
U. S. 5-20 1872, reg.	119 1/2	119 1/2
U. S. 5-20 1872, com.	119 1/2	120
U. S. 5-20 1873, reg.	119 1/2	119 1/2
U. S. 5-20 1873, com.	119 1/2	120
U. S. 5-20 1874, reg.	119 1/2	119 1/2
U. S. 5-20 1874, com.	119 1/2	120
U. S. 5-20 1875, reg.	119 1/2	119 1/2
U. S. 5-20 1875, com.	119 1/2	120
U. S. 5-20 1876, reg.	119 1/2	119 1/2
U. S. 5-20 1876, com.	119 1/2	120
U. S. 5-20 1877, reg.	119 1/2	119 1/2
U. S. 5-20 1877, com.	119 1/2	120
U. S. 5-20 1878, reg.	119 1/2	119 1/2
U. S. 5-20 1878, com.	119 1/2	120
U. S. 5-20 1879, reg.	119 1/2	119 1/2
U. S. 5-20 1879, com.	119 1/2	120
U. S. 5-20 1880, reg.	119 1/2	119 1/2
U. S. 5-20 1880, com.	119 1/2	120
U. S. 5-20 1881, reg.	119 1/2	119 1/2
U. S. 5-20 1881, com.	119 1/2	120
U. S. 5-20 1882, reg.	119 1/2	119 1/2
U. S. 5-20 1882, com.	119 1/2	120
U. S. 5-20 1883, reg.	119 1/2	119 1/2
U. S. 5-20 1883, com.	119 1/2	120
U. S. 5-20 1884, reg.	119 1/2	119 1/2
U. S. 5-20 1884, com.	119 1/2	120
U. S. 5-20 1885, reg.	119 1/2	119 1/2
U. S. 5-20 1885, com.	119 1/2	120
U. S. 5-20 1886, reg.	119 1/2	119 1/2
U. S. 5-20 1886, com.	119 1/2	120
U. S. 5-20 1887, reg.	119 1/2	119 1/2
U. S. 5-20 1887, com.	119 1/2	120
U. S. 5-20 1888, reg.	119 1/2	119 1/2
U. S. 5-20 1888, com.	119 1/2	120
U. S. 5-20 1889, reg.	119 1/2	119 1/2
U. S. 5-20 1889, com.	119 1/2	120
U. S. 5-20 1890, reg.	119 1/2	119 1/2
U. S. 5-20 1890, com.	119 1/2	120
U. S. 5-20 1891, reg.	119 1/2	119 1/2
U. S. 5-20 1891, com.	119 1/2	120
U. S. 5-20 1892, reg.	119 1/2	119 1/2
U. S. 5-20 1892, com.	119 1/2	120
U. S. 5-20 1893, reg.	119 1/2	119 1/2
U. S. 5-20 1893, com.	119 1/2	120
U. S. 5-20 1894, reg.	119 1/2	119 1/2
U. S. 5-20 1894, com.	119 1/2	120
U. S. 5-20 1895, reg.	119 1/2	119 1/2
U. S. 5-20 1895, com.	119 1/2	120
U. S. 5-20 1896, reg.	119 1/2	119 1/2
U. S. 5-20 1896, com.	119 1/2	120
U. S. 5-20 1897, reg.	119 1/2	119 1/2
U. S. 5-20 1897, com.	119 1/2	120
U. S. 5-20 1898, reg.	119 1/2	119 1/2
U. S. 5-20 1898, com.	119 1/2	120
U. S. 5-20 1899, reg.	119 1/2	119 1/2
U. S. 5-20 1899, com.	119 1/2	120
U. S. 5-20 1900, reg.	119 1/2	119 1/2
U. S. 5-20 1900, com.	119 1/2	120
U. S. 5-20 1901, reg.	119 1/2	119 1/2
U. S. 5-20 1901, com.	119 1/2	120
U. S. 5-20 1902, reg.	119 1/2	119 1/2
U. S. 5-20 1902, com.	119 1/2	

reached something like 16,000 tons, mostly the production of the State, we presume, or about 35% million pounds, against 27 millions in 1873, 20% in 1872, 13% in 1871, and 14% in 1870. During the nineteen years from 1856 to 1874, inclusive, the amount sold reached altogether 296 million pounds, equal to 132,143 tons, or on an average, 6,955 tons annually. The average was thus exceeded last year by 9,045 tons. From what precedes it is evident that, next to New York, St. Louis is the most important Lead market on this Continent, and that the progress it has made of late years has been a most remarkable one. The manufacturers of Lead have remained quiet and steady. We quote Bar, 8½c.; Pipe, 9c.; and Sheet, 9½c., less 10 per cent. to the trade.

Spelter and Zinc.—Spelter is dull; Domestic continues to be pressed on the market at 6½c., currency, for ordinary, while the better brands cannot in all likelihood be had below the range of 6·35c., at 6·35c., currency, according to brand. Foreign has sold to the extent of 25 tons in lots, at between 7·05c. and 7·25c., gold, Silesian Union fetching the lower figure, while W. H. brought the extreme one. There is no C. G. H. here at present. The Missouri statistics, which we have referred to, under Lead, also comprise most valuable details about the Spelter production of the various establishments within the State, which is not as large as most people in the metal trade would have given that locality credit for. The figures do not favor the supposition that has been current among us recently that there is over-production. Thus, in 1874, the three works at Caudronet, with their 18 furnaces, turned out 28,763 slabs, together 2,362,800 pounds, against 43,598, slabs, or 1,807,940 pounds in 1873; the Washington Zinc Works, and Page & Kramel, St. Louis, in 1874, together, 1,306,650. Aside from this, a great deal of ore is, it is true, shipped to Lasalle, Ill., and the Cherokee Zinc Works in Kansas. But the five works above named producing but 3,669,540 pounds, or about 1633 tons, while we annually consume in this country between 19,000 and 12,000 tons, certainly looks like the reverse of over-production.

Sheet Zinc.—We perceive from our Belgian exchanges that the Vieille Montagne Co. reduced its price 5 francs, or from 80 francs to 75 francs the 100 kilos. The article is firm here at 9½c. at 9½c., gold, 9 by 36 size.

Antimony—Continues to be rather a disappointment. London has been steady at 25c., equal to 13c. gold, laid down here. Yet we cannot, while the present quiet lasts, quote it any higher than 12½c. at 12½c., gold, at which it closes firm.

COAL.

We have no material change to report in the condition of the Coal market since last week. Business continues very quiet, and outside of the retail trade there is no activity. The miners in most of the Coal regions are still on strike, and have not, so far, accepted the terms offered by the operators; consequently, the prices fixed by the Associated Coal Companies, for the month of March, have not yet gone into effect. The market for Bituminous Coal has somewhat improved since last week, and prices remain unchanged.

Reductions have been made in the transportation of Bituminous Coal on both the Pennsylvania Railroad and also on the Baltimore and Ohio Railroad, so that the Schuylkill Valley and also at Philadelphia they will be supplied from the Cumberland, as well as the Western Bituminous regions.

The following are the reductions made by the Baltimore and Ohio Railroad:

CUMBERLAND COAL.

From Cumberland to—
Locust Point, Camden and Mount Clare..... \$2·90
Locust Point wharves..... 2·65

From Piedmont to—
Locust Point, Camden and Mount Clare..... \$2·65
Locust Point wharves..... 2·40

WEST VIRGINIA AND GAS COAL.

From Newburg to—
Locust Point, Camden and Mount Clare..... \$4·25
Locust Point wharves..... 4·25

From Fairmount and Clarkesburg to—
Locust Point, Camden and Mount Clare..... \$4·75
Locust Point wharves..... 4·75

For street delivery, at private yards, switches, etc., at Baltimore, 50 cents per ton added to station rates.

For delivery to stations of other roads in Baltimore, for transportation thereon when allowed, 30 cents per ton added to the B. & O. station rate.

The Cumberland *Times* says: "The cost of the shipment of a ton of Coal at present rates by the Chesapeake and Ohio Canal is as follows:

Freight..... \$1·35
Shipping expenses at Cumberland..... 98
Toll..... 51
Rushipment, Georgetown..... 25

\$2·19

To which must be added the freight to Philadelphia and New York to put the Cumberland Coal in their markets.

The Anthracite Coal brought into the city during the week ending on the 6th instant, amounted to 175,212 tons, and for the year amounted to 2,352,175 tons, against 2,738,961 to corresponding time last year, being a decrease of 386,786 tons. The Bituminous tonnage for the week was 39,786 tons, and for the year 310,695, against 349,166 tons to corresponding date last year. The total of both kinds of Coal for the week is 214,915 tons, and for the year 2,662,870 tons, against 3,088,124 tons to same time last year.

We quote as follows: Anthracite, \$4·25 @ 6·25; Cumberland, \$6·25 @ 6·50; West Virginia, \$7; James River Steam, \$6·25; James River Carbone, \$9; Kanawha House, \$14·25; American Gas, \$7 @ 7·25; American Cannel, \$12 @ 14; Pennsylvania and Westmoreland, \$7·25; Murphy Run, \$7·40; Newburg Orrel, \$7·50; Sterling Ohio, \$12; Ince Hall, \$17 @ \$18; Liverpool House Cannel, \$17 @ \$18; Liver-

pool Gas, \$11; Newcastle Gas, \$7·50 @ \$8; Scotch, \$9.

The Coal transported over the Cumberland Branch Railroad during the week ending March 13, 1875, amounted to 121 tons, as against 2044 tons shipped in the corresponding period of last year, showing a decrease of 1923 tons. Over the Cumberland and Pennsylvania Railroad, for the same period, the shipments were 22,882 tons, against 22,304 tons shipped in 1874, an increase of 528 tons. The aggregate amount of Cumberland Coal shipped by the various companies so far this year amounts to 193,836 tons.

OLD METALS, PAPER STOCK, &c.

Business in this market has been very active the past week, and dealers have obtained, as a rule, full prices for their accumulations. The demand for Paper Stock, Rags, Book Stock, &c., is steadily improving. The mills are making preparations to increase their productions, and as the supply has been very much reduced, prices have attained more firmness. The only change we have to note in our quotations this week is in Soft Woolen Rags, which has advanced ½ cent. a pound. Old Metals still continue dull, and quotations are nominally unchanged. We quote the following as the current purchasing rates:

Old Metals.—Copper, 16c. @ 17c. per lb.; Yellow Metal, 11c.; Brass, 10c. @ 12c.; Composition, heavy, 13c. @ 14c.; Lead, solid, 5½c.; Tea Lead, 4½c.; Zinc, 4½c. @ 4½c.; Pewter, No. 1, 18c.; No. 2, 16c. @ 18c.; Spelter, 5c. @ 5½c.; Wrought Iron, 12c.; Sheet do., 3c.; Cast, do., 3½c.; Machinery, do., 3c.

Rags, &c.—Canary Linen, 5c. @ 5½c. do.; Cotton, No. 1, 6c. @ 6½c.; No. 2, 2½c.; White, No. 1, 6½c.; No. 2, 4½c.; Colored, do., 2c. @ 2½c.; Mixed, Woolen, 2c. @ 3c.; Soft, do., 2c. @ 2½c.; Gunny Bagging, 1c.; Jute Butts, 1½c. @ 2c.; Kentucky Bagging, 3c.; Book Stock, 3c.; Waste Paper and Scraps, 1½c.; Kentucky Bale Rope, 4c.; Oakum Junk, No. 1, 4½c. @ 5c.; do., No. 2, 3c.; Tarred Shaking, 1c. @ 1½c.; Grass Rope, 2½c. @ 2½c.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending March 16, 1875:

Hardware.

Boker H. & Co. Middletown, 13
Booth R. W. & Co. Anvils, 53

Bedenheim, Meyer & Co. Casks, 1

Folsom H. & D. Guns, 1c., 8

Field A. & Co. Arms, 200

Hayden & Tompkins. Caskets, 1

Jones S. D. Boxes, 3

Langhland & Co. Bundles, 5

Mde. pkgs., 459

Lau & Garrels, 51

Master John W. & Co. Wire rope, coils, 18

McKesson, Robbins & Co. Cutlery, 1c., 2

Murphy, Grant & Co. Cases, 1

Ricardo, B. & Boaz. Gun, 1c., 4

Schuyler, Hartley & Gra-
ham, 1

Wilson & Atkins. Lead, 1c., 2

Wheeler E. S. & Co. Pig, tons, 100

Order. Cases, 50

Spiegel, tons, 200

Steel.

Arnson & Wilinski. Bundles, 5

Colby J. L. & Co. Wire, bds., 175

Naylor & Co. Frog points, 6

Prosser Thos. & Son. Bars, 3

Prosser Thos. & Son. Tire forgings, 56

Spring tons, 132

Spring, tons, 132

186 passenger and 2171 freight cars. We consequently can now give as a statistical fact that the quantity built and to be built since January 1, 1874, represents no less than 1549 locomotives, 1670 passenger and 17,905 freight cars. Of this large amount the government ordered 896 locomotives, 1133 passenger cars and 12,073 freight cars, and the total amount of money which the grand total we gave represents is no less than £1,000,000 in gold. The work is now in progress, and the exception of 30 locomotives, was built at home, and as we are in hopes of accomplishing this year twice as much as in 1874 in general railroad construction, it will be perceived that we are not idle, and that the great railroad interests of Central Europe are being pushed with the utmost vigor. It will not last long, and the general metal trade will feel the beneficial effect of so much enterprise.

HOLLAND.

(Evans & Co.)

ROTTERDAM, Feb. 27, 1875.—*Tin.*—Banca, spot, sold from 53½ down to 52½ guilders; to delivery from the March sale at 53½; May 53½; and Billiton, to arrive, at 52 to 52½. Deliveries of Banca by Dutch Trading Society during the current month, 922, also against 12,025 in 1874. During the same months, 14,084, against 15,882, to arrive, warrants this day, 23,312, against 22,300; unsold stock, 106,840, against 115,010; all from Banca, 1500 piculs, against 3350 in 1874. Stock on warrants of Billiton, 200, against 100 slabs; unsold stock, 2953, against 3067. Billiton stock in the hands of Amsterdam and Rotterdam merchants, 29,065 slabs now, against 21,153 slabs a year ago.

SOUTH INDIES.

(Dummer & Co.)

BATAVIA (Java), January 21, 1875.—*Tin.*—On the 14th ultimo 9022 piculs Billiton sold at auction, averaging 59½ guilders per picul. The next auction is on Feb. 8. *Cool.*—A cargo of English has been sold, delivered at Semaraya, at 23 guilders, and another one delivered here, at 21. *Lead.*—M. A. Aderhain at 21. Here we learn of a cargo of Australian maize at 21. *Exchange* on London, 11½ to 11½ guilders, 6 months' sight, per pound sterling.

(Clark, Spence & Co.)

POINT DE GALLE, Ceylon, Feb. 4, 1875.—*Plumbago.*—There is great scarcity of ready made lump, and business is consequently restricted, there being no demand for the lower qualities. We severally quote Lumps, Chips and Dust, free on board, per ton £18 to £18½; £11 to £11½; and £6 to £6½ per ton. *Cool.*—We have had no arrivals of English coal for some time, imports have proved more attractive than our immediate neighborhood. The supply to steamers has been again on a most limited scale. We continue to quote £2 free abeam, but should the reported large strike in South Wales prove of a protracted nature, prices of Cardiff coal must undoubtedly advance. Exchange, 1½ to 1½.

(Gifford, Wood & Co.)

SINGAPORE, Jan. 29, 1875.—*Tin.*—Duller accounts from Europe have caused a decline in prices here, and a chance purchase is reported at £24 75 per picul, but the market price is £24 57½ per picul, below which dealers refuse to go. For the last two months iron and steel, including the Jupiter T, of 870 ton capacity, has been chartered for New York for £7000 in full. For Boston the Glamorgan has been chartered on secret terms. Exchange, 4½ to 4½. January Tin shipments to the United States, 6995 piculs, against 5133 in 1874, 3572 in 1873, 3424 in 1872, 2753 in 1871, and 1855 in 1870.

(Sandilands, Buttery & Co.)

PENANG, Jan. 29, 1875.—*Tin.*—Tin has kept very firm during the fortnight, notwithstanding that large supplies have come to market. A good business has been done for Europe and America at £24 to £24 10 per picul, value being supported by Chinese speculators, who entered the market and bought up a fair quantity in our opinion. The market is now quiet but there are still sellers under £24.

The arrivals during the fortnight amount to 10,000 piculs in all, of which about 6000 piculs have been taken for Europe and America, and 4000 by Chinese, the greater portion of the latter being on speculation. Exchange, 4 ½ to 4 ¾.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

SHEFFIELD, Eng., March 1, 1875.

THE TRADE OUTLOOK

does not grow much brighter in any single direction, and it cannot truthfully be said that the advent of the third month of this year of grace brings any cheerful assurance as to the immediate future. We do not appear to make much progress in the way of getting prices down, but I think that consummation would, at all events, have appeared to be within reach had it not been for the inopportune occurrence of the South Wales strike. Neither does the demand grow appreciably stronger, the abstraction of the Welsh production of iron absolutely failing to strengthen the market in more than an infinitesimal degree. In the face of these two facts, and the continued comparative dearth of fuel, it is not very surprising to find that many of the ironworks in various parts of the country are being laid off, and that the remainder are merely being run on a purely hand-to-mouth basis. The price of pig iron has never yet fallen in proportion to the drop in finished iron and rails, and its cost constitutes another of the many obstacles in the way of lower quotations. Iron rails are not selling very well, and the total demand is of so slight a character that the closing of the Welsh works has caused no real benefit to the Cleveland makers. Steel rails are also very little sought after, but there is reason for supposing that as the year grows a little older, several heavy British and Russian orders will be placed. The makers are preparing to lower wages again, hence, I conclude, on what I take to be good grounds, that the British agents in Canada and the States will be prepared to make a desperate fight for all orders that may be put into the market, either openly or in private.

THE SOUTH WALES STRIKE

shows no signs whatever of approaching a termination—it even appears likely to be prolonged. The men are making a truly gallant fight this time, and their powers of endurance are being tested to the utmost by the hard wintry weather we are again experiencing. The "pluck" of the locked-out miners and others is apparently exciting the admiring sympathy of their fellow workmen in other districts, inasmuch as at a special conference of the Miners' National Association last week (Mr. A. McDonald, M. P., presiding), £1000 was voted and sent off at once, and a further resolution was passed levying a call throughout the various branches of the association. Further than this, and of higher practical significance, the Durham miners have deliberated on the causes, effects and general aspects of the Welsh dispute, and have decided to hand over not less than £50,000 to ward the support of their brethren in the principality. That is "support" of the proper description, and is more likely to do the men good than the driblets of £100 or £200 which are being sent by other trades societies. The masters in other districts are, however, preparing to checkmate these allies by giving notice of reductions in their wages, so as to give them something to consider more closely af-

fecting themselves than the strike in Wales. At Merthyr last week 2100 men were engaged in breaking stones on the roads, and 500 were employed in making a new road to Port Lotlyn. As an earnest of the united and resolute firmness of the employers, a to-day's telegram informs me that the eight furnaces at Dowlais which have hitherto been in half blast, are to be entirely blown out, and not only so, but a meeting of the Employers' Association is about to be called for the purpose of considering the necessity and propriety of increasing the reduction to 20 per cent. Altogether, both sides appear well organized and united, but I personally believe the employers will succeed, if the masters in Yorkshire and Durham also now give notice of a drop.

THE SCOTCH PIG IRON MARKET.

The Glasgow warrant market became much livelier at the beginning of the week than it had been for some little time previously, and during the subsequent days quotations were run up to 75 6 for cash. A day or two later, however, a weaker tone began to be observable, so that at the close of business for the week buyers offered no higher than 74 3 and 74, which sellers were willing to accept within 6d. per ton. Special brands of makers' iron also became a little dearer, closing at the following, as reported by John E. Swan & Bros. (Limited), under date Feb. 26th:

Glasgow Brands.	Prices.					
	Furnaces	Boring, 122	Furnaces	Out 35.	Furnaces	Built, 157.
	No. 1.	No. 3.	No. 4.			
Gartsherrie.....	14	2	16	88.6	78	..
Coltness.....	12	0	12	92	77	..
Summerlee.....	6	2	8	87.6	76	..
Langloan.....	7	1	8	90	77	..
Govan.....	5	0	5	87.6	74	..
Calder.....	6	2	8	90	76	..
Shotts' Bessemer.....	5	2	7	92.6	87.6	..
Carnbroe.....	4	2	6	84	76	..
Wishaw.....	2	1	3	..	..	..
Monkland.....	6	3	9	76	74	..
Chap. Hall.....	..	..	..	..	..	..
Clyde.....	6	0	6	76	74	..
Quarter-Clyde.....	4	1	5	76	74	..

*f. o. b. Glasgow, 1/ per ton, extra.

Glasgow Warrants, 3-5 No. 1; 2-5 No. 3, g. m. b., 74/6.

WEST COAST BRANDS—f. o. b. Ardrossan.

Glenarnock.....	7	1	9	86	77	78
Arden.....	4	1	5	..	..	..
Redland.....	2	1	2	..	..	..
Lugar.....	4	0	4	..	..	..
Minirkirk.....	3	0	3	70	74	75
Portland.....	3	3	6	..	..	..
Dalmellington.....	6	2	8	75	74	72/6

EAST COAST BRANDS—f. o. b. in the Forth.

Kinnel.....	3	1	4	82.6	73	72/6
Almond.....	2	1	3	76.6	73	..
Carson's Select'd.....	5	1	6	85	76	..
Lochgilphead.....	2	2	4	75	72/6	..
Lumphanan.....	0	2	2	..	..	70
Brigden's.....	0	2	2	..	..	..

Furnaces in blast in Scotland.....

1875—122

1874—117

No. 1. No. 3. No. 4.

G. M. B., at Glasgow.....	76	6	74/6
Gartsherrie.....	89	..	78/6
Coltness.....	92	6	77
Summerlee.....	86	..	76/6
Langloan.....	86	..	76/6
Carnbroe.....	85	6	74/6
Glenarnock, at Ardrossan.....	86	6	77/6
Eglington.....	76	6	74/6
Dalmellington, ".....	76	..	74/6
Shotts, at Leith.....	88	..	77/6
Kinnel at Boness.....	83	..	74

The malleable iron trade is somewhat better, and a very satisfactory amount of work is being turned out by the principal pipe founders. Freightings are unchanged. Pig iron for blast is 5 per ton easier, being now quoted 55 per ton. The stock in Connal's stores continues to dwindle, there being now only 29,164 tons on hand there. This is, of course, exclusive of the stocks in the yards of the various makers.

CLEVELAND AND CUMBERLAND.

There is little change to record in the condition of the iron works of these two districts. The rail mills of Cleveland are very poorly engaged, but those at the Barrow works are still running in execution of their old dated large Canadian order, and some others of more recent date secured at very low prices in the teeth of Sheffield competition.

TRADES OF SHEFFIELD.

There is again but little change to record in the state of trade here. A little more business is being done in Bessemer steel in the rough, although there is little alteration in the steel rail departments. Hematite pig iron is rather steadily held, at the following figures: Maryport hematite: No. 3, 90/; No. 4, 87/; No. 5, M. & W. 87, Bessemer: No. 1, 92/6; No. 2, 90/; and No. 3, 87/6. Millom Bessemer: No. 1, 90/; No. 2, 87/8; and No. 3, 85/; ordinary: No. 3, 85/; No. 4, 84/; No. 5, 90/; mottled: 95/; and white, 105/. In the rail trade matters appear to be at a complete dead-lock. An American contract of good proportions—25,000 tons of iron rails, and 22,000 tons of Bessemer steel rails—has just been awarded to a native firm in the face of offers from several leading British firms, including the representatives of a famous Sheffield company. The local tender was about 10/ per ton higher than the successful offer.

As regards the Law of Conspiracy we recommend that the alteration we have suggested should be made, but we are not prepared to recommend any other alteration in the law.

This is too much for the trades union's parliamentary committee, which has, accordingly, met and fired off the following "chilled" shot:

"The inevitable conclusion arrived at, after the most careful study of the report, is that it is one-sided and hostile to the working classes. Upon the question of contract, strike, the Master and Servant Act, the Criminal Law Amendment Act, and the Law of Conspiracy, there is a complete conflict now raised between the views of the commissioners and those of the working classes: not only a conflict as to facts relating to labor with a view to legislation, but the direct conflict upon moral questions. That which the report stamps as confederacies the working classes regard as their cherished institutions, to which they look as their means alike of safety, protection, and of progress. They regard the compulsion of employers, which is styled wrongful, as just and right when in a just cause, as noble efforts of self-sacrifice for the good of the many. The working classes of this country have already on these questions appealed to the only tribunal they recognize on legislative matters—

namely, the House of Commons. They cannot but look upon the report of the commission as dangerous to their existence, and to all they are striving to attain. It is in no spirit of hostility, but with unfeigned respect for the judges, of whom, as ministers of justice, they are rightly proud, and with deep regret that the judges should have been dragged into the heated arena of political conflict, that the masters union leaders declare their repudiation

enclosed were quite different from the surrounding basalt, and were of similar composition to the meteorites of Juricas, Jonzao and Stannern, formed of augite and anorthite, which compound M. Rose had called eukrite; further, that the troilite had a similar composition to that in many specimens of meteoric iron.

From these data, the explanation might be deduced (according with that of M. Nordenekjold), that a shower of meteorites, consisting of eukrite, as well as iron and troilite, had entered the basaltic mass, when this was yet liquid. But the new observations also favored an explanation in the other direction indicated.

It is true, the enclosed pieces of iron, eukrite, and troilite, were similar to the corresponding constituents of known meteorites, but they were only similar; there was no perfect agreement in any case. All three were considerably different. In their petrographical and chemical relation, from those in previous meteorites.

M. Nauehoff calls attention to the fact that the doleritic masses found have, in many cases, a crust or rind, which is chemically and petrographically different from the interior. This, again, is not favorable to the view that these were meteorites, for the latter present (as might be expected from their fragmental character) no such layer.

As regards the occurrence of stone and iron masses in the basalt, this seems equally to favor both views. The occurrence, indeed, of little balls of troilite, which are seldom so big as a pea, might perhaps raise a difficulty for the meteorite hypothesis; because, supposing the ejected basalt to have already acquired a crust when these small bodies fell on it, they would not sink into it; and supposing there was no crust, and that the basalt was so liquid that they could penetrate it, the large iron lumps would have sunk to a greater depth. Still, as the condition of an eruptive mass cannot be at all points the same, and as the troilite falling in thick shower with the iron, or connected with it, might be carried in, this difficulty may not be regarded as serious.

The subject has been taken up by the eminent mineralogist, M. Tschermak. He has made a comparative examination of the meteoric eukrite of the meteorites named above, and the eukrite of Ovifak, of which he received specimens, some of the kind containing iron, others without iron; he also examined pieces of the surrounding basalt. The results of his examination (communicated in *Mineralogische Mittheilungen*) are briefly as follows:

The meteoric eukrite and the eukrite of Ovifak present considerable differences of character, and the question is, what weight must be allowed to these differences in deciding the point? The structure of the meteoric eukrite is tuff-like, that of the Ovifak stone quite compact. Such differences, however, are often found in known meteorites. The ordinary meteor stones, chondrites, are frequently tuff-like; others, chemically resembling them, compact and crystalline.

The component parts show great differences in texture and enclosed pieces (*Einschlüsse*). The characteristic fine brown and black microscopic particles enclosed in meteoric anorthite, are entirely wanting in one of the Ovifak specimens. But as such occur in the other, though in less quantity, the difference is, perhaps, not specially important. The augite in the stones of Ovifak is without characteristic enclosed pieces; that of meteoric eukrite has frequently such (passing as oblique streaks through the small columns of augite, and, with greater magnifying power, resolved into violet or brown dust-like particles). This difference has no special significance, as not all meteoric augite has these enclosed pieces. There is a striking difference in the form of the augite. All meteoric augite shows individual crystals, little columns, whereas that of Ovifak has no such form, but merely fills up the gaps between the other minerals; an occurrence not known in meteorites, but characteristic for dolerite, gabbro, and diabase. This feature of the augite in the Ovifak stone favors the opinion of a telluric origin.

As regards the iron and troilite present, there is merely a difference in relative quantity, which cannot be of much importance. The occurrence of magnetite and graphite, on the other hand, which are wanting in meteoric eukrite, is a peculiarity of the Ovifak stone, which is, for the moment, striking. When we consider, however, that the greater mass of the enclosed pieces in the Ovifak stone are of iron which is rich in these bodies, and that the composition of this iron does not contradict the supposition of meteoric nature, it must be allowed that here a comparison with meteoric eukrites falls away.

The fact that the stones found show differences of structure and composition does not agree with the opinion that they are of telluric origin; for such have never hitherto been met with in basalt-enclosed pieces; on the other hand, we have here a similarity to meteorites, inasmuch as, in several meteoric showers, which have furnished many pieces, such dissimilarities have also been observed (Stannern, Pultusk). The occurrence of a crust-layer, of which M. Nauehoff speaks, favors neither the one nor the other hypothesis. It is to be remarked that the phenomenon does not occur so constantly and distinctly as to have special importance attached to it. In the specimens I examined I found no such crust; I consider the phenomenon accidental.

The internal nature of the Ovifak stones, therefore, presents nothing contrary to previous observations of meteorites; only the mode of occurrence of augite is similar to that in earthly kinds of rock. On the other hand, the hypothesis of telluric origin is opposed by the fact, that hitherto nickel iron, as a constituent of earth rocks, has never been met with, and as little the union of such iron with troilite and graphite.

I am therefore of the opinion, that from a

careful examination of all the circumstances, we can only infer the Ovifak stones to be of meteoric origin.

Official Test of the Holly Water Works, at East Saginaw, Mich.

Through the kindness of Mr. Byron B. Buckhout, of East Saginaw, Mich., we lay before our readers the following official test of the Holly Water Works, which took place at that city on Jan. 1874:

The test were promptly made, and the volume of water thrown and distance reached was highly satisfactory to the committee appointed, composed of the leading citizens. It is but needless to say that the "Holly System" of water works are the only kind recommended by this committee.

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Shooting Tackle, &c., furnished to DEALERS only.

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HERCULES IRON CUTTER.

No. 1, weight 16 lbs., cuts $\frac{3}{4} \times \frac{3}{8}$ inch, or $\frac{1}{4}$ inch round or square. Price \$25.00
No. 2, " 165 " $\frac{3}{4} \times \frac{3}{8}$ " $\frac{3}{4} \times \frac{1}{4}$ " " " 50.00
No. 3, " 350 " $\frac{3}{4} \times \frac{1}{4}$ " 1 " " 75.00

This is by far the most powerful Iron Cutter in use which can be worked by hand, having three times the capacity of any other machine which sells at the same price. No. 3 occupies a space of 12x24 inches, when in use additional space must be had for the long work. Worked by a set of knives with each machine—one for square and flat, the other for round iron and steel. By using the knives adapted to it, round iron is cut without being flattened. One man can cut the largest size iron named above, but two would be required for steady work. It does not take a minute to change the knives or to shift the machine from large to small sizes.

AUGUSTA, Ga., March 3, 1875.
MILLERS FALLS CO.—Enclosed find draft for amount of invoice, January 7. We would have sent the amount before, but did not have an opportunity of trying the Iron Cutter until a few days ago. It is one of the best machines we ever saw.

Yours truly, MOORE & CO.

Office of the ATHENS FOUNDRY AND MACHINE WORKS, I.

ATHENS, Ga., February 18, 1875.

H. L. PRATT, President.—Dear Sir: Enclosed find draft made payable to your order by Messrs. Childs, Nickerson & Co., in payment for Iron Cutter. We have put our Cutter to good service, and find it cuts easily 1 $\frac{1}{2}$ round, and $3\frac{1}{2} \times \frac{1}{2}$ square iron. C. N. & Co. are pleased with their, say it will save many a blow and cold chisel in their iron house.

Truly yours, R. NICKERSON, Agent.

We make a satisfactory discount to dealers, and warrant the cutters to do all which we claim for them. Send for prices.

MILLERS FALLS COMPANY,

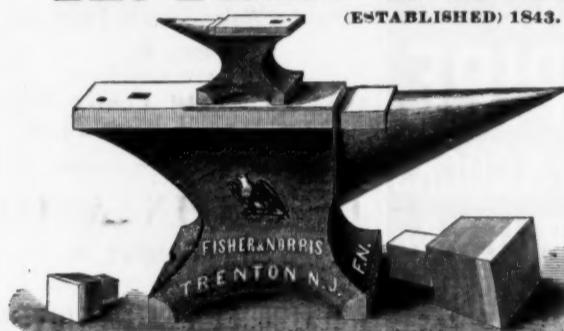
No. 78 Beekman Street, New York,

Sole Proprietors and Manufacturers of the

Barber Self-Fitting Bit Braces, Millers Falls Vises, Improved Angular and Ratchet Drilling Machines, TUBE SCRAPERS, FAMILY TOOL CHESTS, Patent Adjustable Tool Holders, Mitre Boxes, Ratchet Braces, Breast Drills, etc.

The Fisher & Norris Eagle Anvil Works.

(ESTABLISHED) 1843.



These Anvils are manufactured at the oldest Anvil Foundry in this country. They are superior to the best English, or other Anvils, on account of the peculiar process of their manufacture (Invented and used only by this concern), and from the quality of the materials employed.

The best English Anvils, after a time, become hollowing on the face by continued hammering in use, on account of the fibrous nature of the wrought iron—causing it to "settle" under the face.

The body of the Anvils being of crystallized iron, no such settling can ever occur, and the steel face, therefore, remains perfectly true. Also, it has the great advantage that being of a more solid material, and consequently with less bound, the piece being forged receives the full effect of the hammer. Instead of a part of it being wasted by the rebound, as with a wrought iron anvil. An equal amount of work can, therefore, be done on this Anvil with a hammer one-fifth lighter than that required when using a wrought iron anvil which is more elastic.

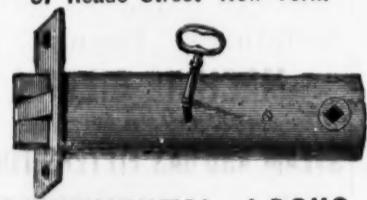
The working surface is in one piece of JESUP'S BEST TOOL CAST STEEL, which, after being secured to the body, gives the proper temper for the heaviest work. The horns are covered with and its extremely made entirely of steel. The body of the Anvil is of the strongest grade of American iron, to which the cast steel face is warranted to be thoroughly welded and not to come off.

REDUCED PRICE LIST. ANVILS weighing 100 lbs. to 800 lbs., 11c. per lb.
Smaller Anvils, ("Minima")
No. 0 15 lb. 2 lb. 3 lb. 4 lb. 5 lb. 6 lb. 7 lb. 8 lb. 9 lb.
Price, \$2.50 \$4.25 \$5.00 \$5.50 \$6.50 \$7.50 \$8.00 \$10.00 \$12.00

THESE GOODS ARE SOLD BY THE GENERAL AGENTS (with special discounts to the trade).

New York.—Messrs. J. CLARK WILSON & CO.—RUSSELL & ERWIN MANUFACTURING COMPANY.—Messrs. HORACE DURRIE & CO., Boston.—Messrs. GEORGE H. GRAY & DANFORTH, Philadelphia.—Messrs. JAMES C. HAND & CO., Baltimore.—FISHER & NORRIS, Trenton, N. J.—MORE.—Mr. W. H. COLE.

Schweitzer Mfg. Co.,
57 Reade Street New York.



CONTINENTAL LOCKS.

Made of Wrought Iron or Brass, very superior in quality, and only an auger used in mortising.

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EXCELSIOR DIVIDERS,

WTB

STUBS' STEEL POINTS,
Best and Cheapest Goods in the market. Sole Agents for the United States for

NEWBOULD'S FILES AND TOOLS

French Coffee Mills.

NOBLE MFG. CO., Tools, Ship Augers, &c.

We also make a superior

AXE. ("Queen of the Forest," &c.

Dissert's Saws. (Largest Stock in the City.)

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Solid Cast Steel Carpenters' and Machinists' Hammers, Mining Sledges and Blacksmiths' Tools,

TACKLE BLOCKS,

And Humphrey & Bartlett's Horse Brushes.

BARR'S ELLIPTIC
Steam Trap



THE BEST IN THE WORLD
SEND FOR A CIRCULAR
Richard & Pike,
905 LEDGER PLACE, Philadelphia

GRAHAM BROS.,
London and Stockholm,
Engineers, Anglo-Swedish Merchants
And Engineers' Agents.

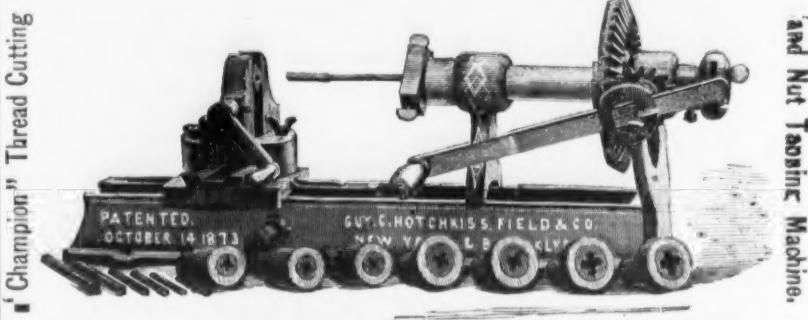
First-class Makers of Machinery & Specialties,
&c., desirous of extending their exports, will find it in
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prices, &c., &c.

London—122 Cannon Street, E.C.

STANDARD
32 Cal.
Just Out.

Guy C. Hotchkiss, Field & Co.,

85 First St., Brooklyn, E. D., and New York City.

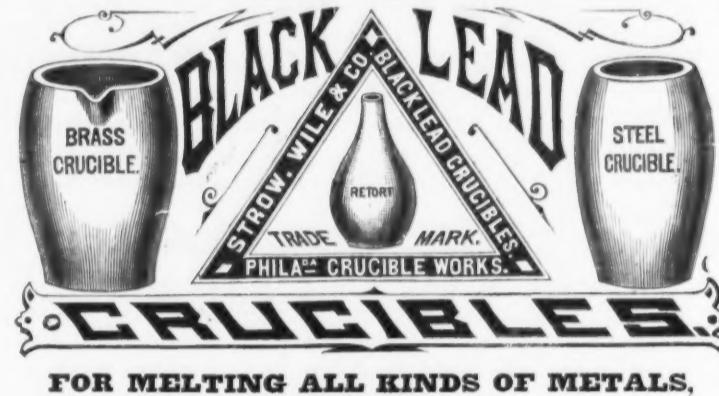


This machine has revolving and sliding jaws, which enables the operator to cut all kinds of work, no matter how irregular in shape it may be. It cuts a perfect thread at once going over. As much work can be done in one hour by this machine as in a day with stocks and dies. Send for Circular.

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IRON AND STEEL.



FOR MELTING ALL KINDS OF METALS.

And Manufacturers of

Sunny Side Stove Polish.

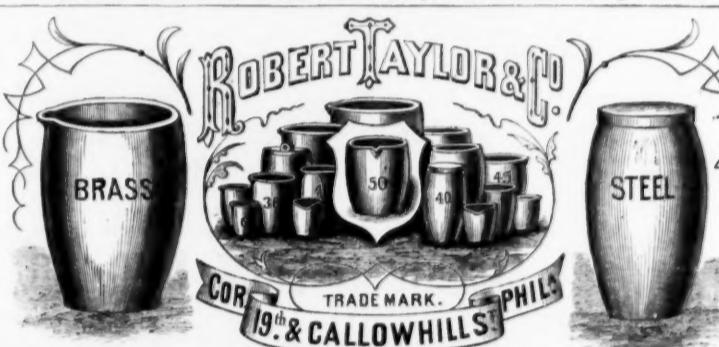
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BLACK LEAD CRUCIBLES

Of all Sizes and Forms for melting

Steel, Brass, Gold, Nickel and all kinds of Metals.

Mr. Robert Taylor, who was for seven years the head of the late firm of Taylor, Strow & Co., and who is a practical mechanic, and familiar with all the details of the manufacture of Crucibles, attends personally to our manufacturing department. We would, therefore, respectfully solicit a continuance of the favors hitherto extended to him.

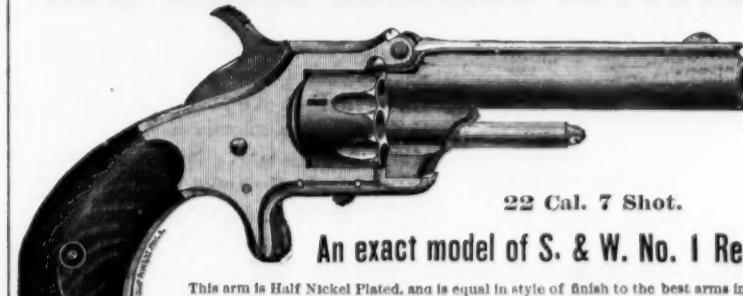
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NEW MODEL DERINGER REVOLVER.



22 Cal. 7 Shot.

An exact model of S. & W. No. 1 Revolver.

This arm is Half Nickel Plated, and is equal in style of finish to the best arms in the country. Quality of workmanship and material first-class, and guaranteed in every respect. Price less than any other Hinge Barrel Cartridge Revolver in the market.

Sole Agents, EDWARD K. TRYON, Jr. & CO., FIRE ARMS.
No. 19 North Sixth Street and No. 220 North Second Street, PHILADELPHIA.

NEW HAVEN NUT CO.,

MANUFACTURERS OF

HOT PRESSED NUTS

Of Superior Quality of all sizes, both

HEXAGON & SQUARE,

From $\frac{1}{4}$ inch to and including $1\frac{1}{2}$ inch bolt.
Factory and Office, - - - - - WESTVILLE, CONN

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Cutter, Importers of.	36
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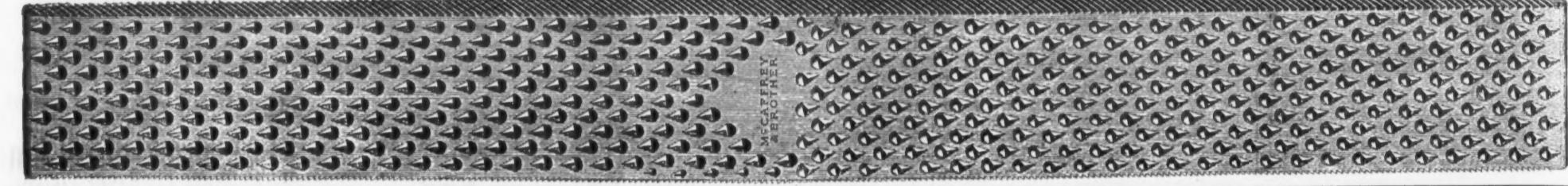


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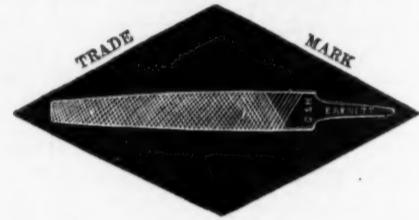
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PRICE LIST.

The Law of Patents

[Concluded.]

PATENTS AND PATENTEEs.

A misnomer in a patent of the Christian name of one of the patentees does not invalidate it if it contains a description of him by which he can be identified.

Where one or two patentees was described in the patent as joint inventor with the other, and was identified as such, the patent was held valid, although his Christian name was erroneously stated.

[N. W. Fire-Extinguisher Co., *et al.* vs. The Philadelphia Fire-Extinguisher Co., 34.

A patent raises the presumption that the grantee is the first inventor of the article monopolized; and to overcome this it must be shown that there was a prior knowledge of the invention under such circumstances as to give the public a right to continue the use of it.

If a reasonable doubt exist as to the truth of the evidence adduced to impeach the novelty of the invention, the presumption in favor of the patentee must prevail over it.

[Crouch vs. Speer *et al.*, 187.

A patent is void which claims substantially the same thing which is claimed by the same party in a prior patent.

[Brown vs. Hatch, 392; Brown vs. Selby, *et al.*, 392.

Although a man may make valuable improvements upon a patented machine and obtain patents for them, he cannot use the elements of the original machine without infringing on the first patent.

[La Baw *et al.* vs. Hawkins *et al.*, 724.

PLEADINGS AND PRACTICE.

The testimony of witnesses of whose names no notice was given to the complainants is admissible to show the state of the art; but will receive no consideration upon the question whether there had been a prior knowledge and use of the invention.

It will require strong evidence to overcome the presumption that a patented machine is substantially different from one patented before, which arises from the Commissioner's having not only issued the second patent with the knowledge of the other, but having afterward reissued it and extended it.

The experts produced by the parties having disagreed whether the machine covered by the

patent in suit was anticipated by one previously patented, the court examined the question itself, and held that it was not.

[La Baw *et al.* vs. Hawkins *et al.*, 724.

Where the answer denies that the patentees were the first inventors of the improvement, but gives no notice of the persons by whom, or the places where, it had been previously known or used, evidence of foreign patents and other evidence in support of the answer will not be regarded.

[Earl vs. Dexter *et al.*, 299.

Evidence against the novelty of the invention of which no notice had been given was held to have been properly received by the master, and the objections should be taken by a motion to suppress the testimony, and not by exceptions to the master's report.

Where it does not appear from the master's report that there was evidence before him to sustain a charge which he has allowed, it will be stricken out.

If an appeal from a circuit court to the Supreme Court does not operate as a supersedeas, security will usually be required of the appellant to only double the amount of costs that the appellee may recover.

If it operates as a supersedeas, further security will be required to twice the value of what is to be recovered.

Where the matter in controversy is secured by other means the rule will be modified at the discretion of the court.

[The American Nicolson Pavement Co. vs. Elizabeth City *et al.*, 764.

PRELIMINARY STATEMENTS.

The preliminary statement which a party to an interference makes in pursuance of the rules of the Patent Office does not estop him from showing in a suit at law that he made the invention at an earlier date than he there assigned it.

[Union Paper Bag Machine Co. vs. Crane *et al.*, 801.

REDUCTION TO PRACTICE.

If any one originates certain devices which work well without alteration in the machine for which they are intended after it is completed, a subsequent inventor cannot claim them, although he perfects the machine in which he employs them before the other perfects his.

But he may claim them in a new combination of them with devices of his own which result in a useful machine.

[Brown vs. Guild, 392; Brown vs. Selby *et al.*, 392.

A patentee held to have made his invention when he had a machine embodying it completed and in operation and actual use, though the use was private.

[Knox *et al.* vs. Loweree *et al.*, 802.

REISSUES.

It is to be presumed, from the fact of a reissue, that the inventions described in the original and amended patents are the same.

[Bantz vs. Elsas *et al.*, 117.

The question of fraud in obtaining a reissue must be regarded as settled by the Commissioner of Patents in granting it.

[Brown vs. Guild, 392; Brown vs. Selby *et al.*, 392.

It is to be presumed from the decision of the Commissioner of Patents, in granting a reissue, that it embraces the same invention as the original patent; and the contrary can be shown only by a comparison of the papers in the two cases.

A reissued patent can only be impeached for fraud by a bill in equity brought for the purpose by the government.

[Birdsell vs. McDonald *et al.*, 682; Birdsell vs. The Ashland Machine Co. *et al.*, 682.

Whenever a patent is reissued or extended the presumption is that it is for the same invention, and the action of the Commissioner is conclusive against a charge of fraud in obtaining extension, or the reissue, as well as all other objections, unless it appears upon the face of the papers that the new patent is not for the same invention as the original.

[La Baw *et al.* vs. Hawkins *et al.*, 724.

Neither reissued nor extended patents can be impeached in suits upon them for fraud in obtaining them.

The granting of a reissue is conclusive as to its validity, unless it appears from a comparison of the papers that the invention is not the same with the one originally patented, or that the Commissioner has exceeded his authority in granting it.

[The Milligan & Higgins Glue Co. vs. Upton, 837.

The validity of a reissued patent is not affected because it describes features not described in the original, and points out their functions, if there were shown in the original drawings.

[Bantz vs. Elsas *et al.*, 117.

A reissued patent held valid which claimed a spring constructed of an India rubber column inclosed in a spiral metal spring, although it

was conceded in the original application that such a spring was described in a previous patent, it appearing that it was not so described.

Although the original patent everywhere represented the India rubber column as deeply fluted, yet a reissued patent was sustained which claimed an India rubber column in unqualified terms, without alluding to the fluting.

The reissued patent was held valid, although it claimed the rubber column whether solid or hollow, and the original patent made no mention of a hollow column.

It was held to be no objection to the reissued patent because it suggested that any material which was the equivalent of India rubber might be used instead of it, such as animal or vegetable fiber, gutta percha, &c., although those materials were not mentioned in the original.

[The National Spring Co. vs. The Union Car Spring Manufacturing Co., 224.

The complainant's original patent claimed glue reduced to minute shavings by rasping process performed in a machine constructed to give the glue such a form and no other. His reissued patent described the same process and machine, and claimed the product. It was held valid, although it also contained amendments evidently intended to cover glue reduced to fine particles by crushing or other means.

[The Milligan & Higgins Glue Co. vs. Upton, 837.

A patent for a combination of four elements cannot be reissued for a combination of three of the original elements with a substitute for the fourth, unless it was known at the date of the patent to be a proper substitute; and it should be explained, it seems, that the substitute is an equivalent for the omitted element, and why the change is made.

A patent for a combination of four elements, which does not suggest any other improvement, cannot be reissued with a claim for a combination of three of those elements, omitting reference to the fourth.

A suit for the infringement of such a reissued patent cannot be maintained against any one who uses a combination of the three elements embraced in it, even though he uses with them a substitute for the omitted element.

[Gill vs. Wells, administratrix, 881.

REJECTED APPLICATIONS.

An application for a patent which stands rejected will not, in such a case, avoid the subsequent patent.

[Brown vs. Guild, 392; Brown vs. Selby *et al.*, 392.

TRADE MARKS.

The name of an incorporated borough cannot be protected as a trade mark, even though it was adopted and used before the borough was incorporated, or there was a town in the place.

[The Glendon Iron Co. vs. Uhler, 187.

UTILITY.

In order to render a device patentable it need not possess greater utility or be better than others of the kind; it is sufficient if, being new, it serves a useful purpose.

[Crouch vs. Speer *et al.*, 187.

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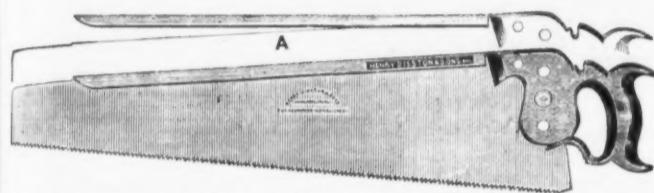
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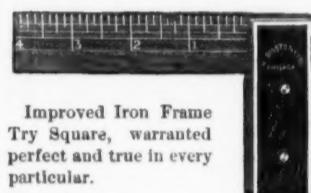
Pork Packers' Saw.



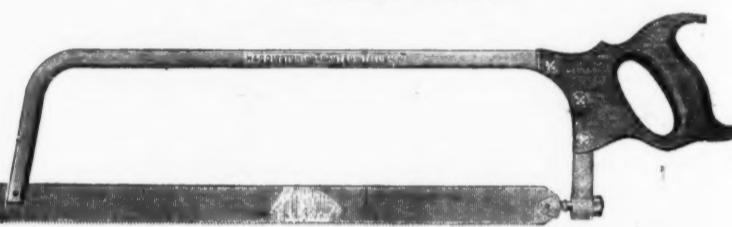
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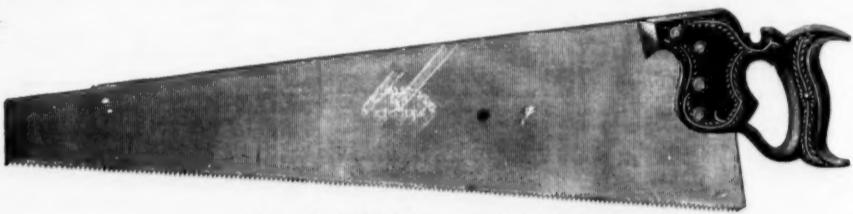
New Patent Skew Back Hand Saw.



Hand Saw with adjustable handle. The thumb screws in the handle operate on the butt of the saw blade, and can be so adjusted as to give the blade any desired pitch.



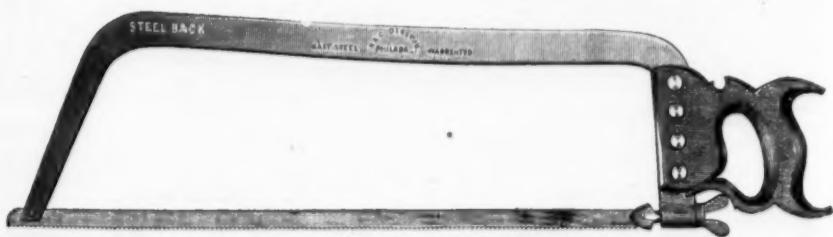
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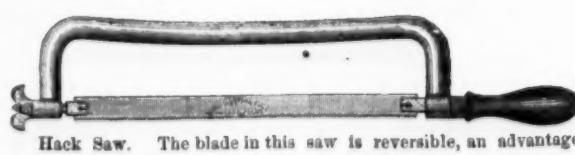
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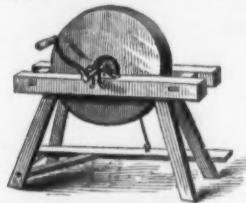


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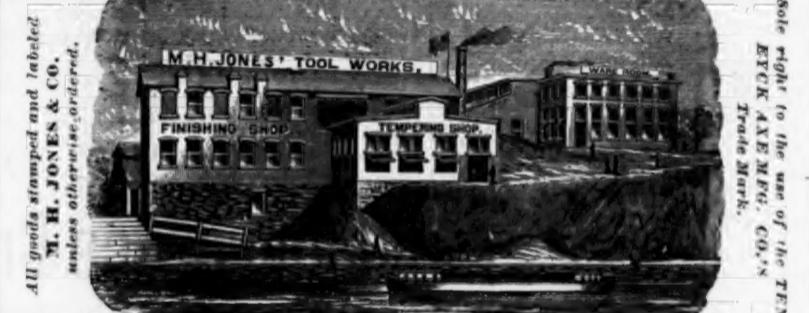
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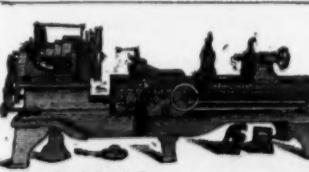
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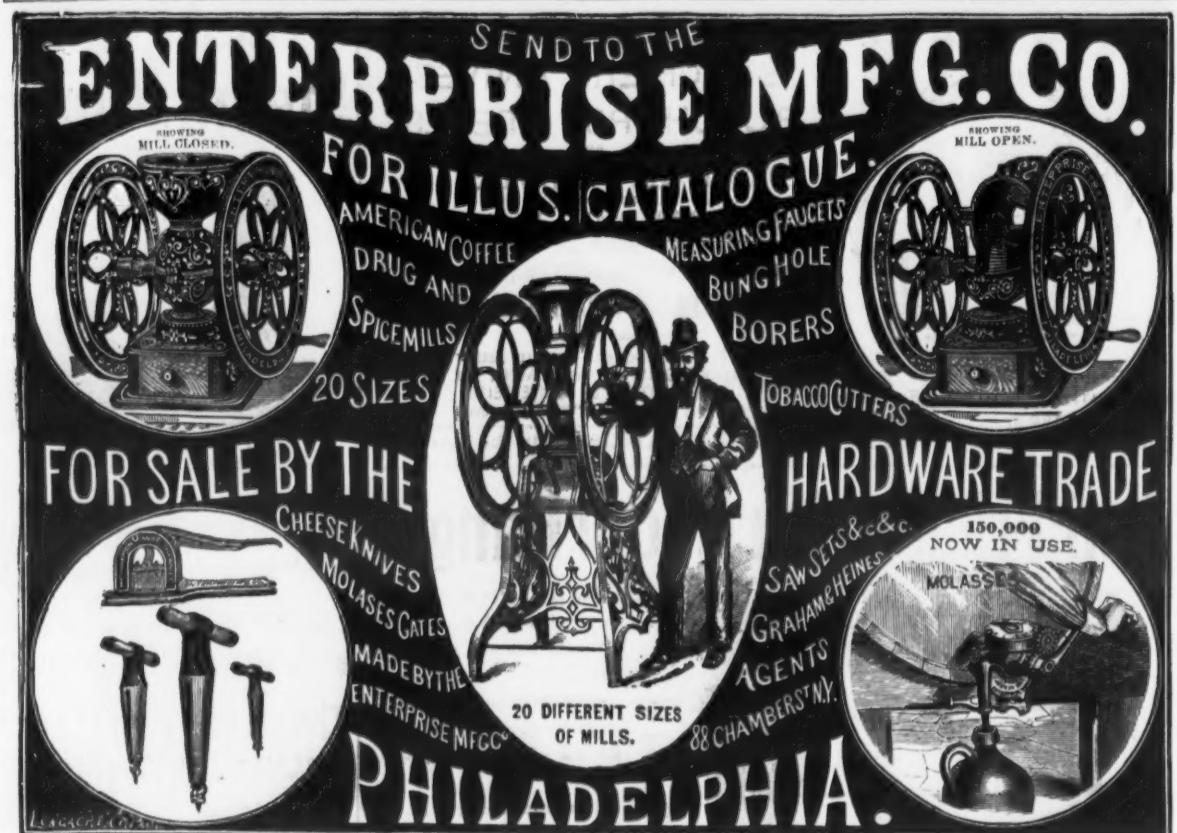
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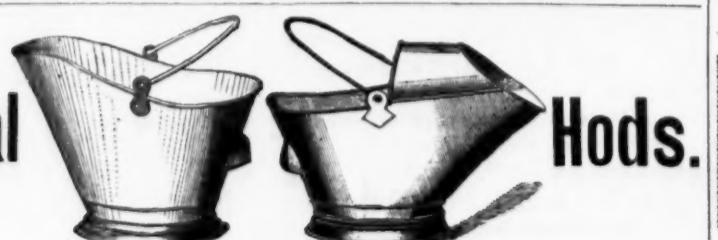
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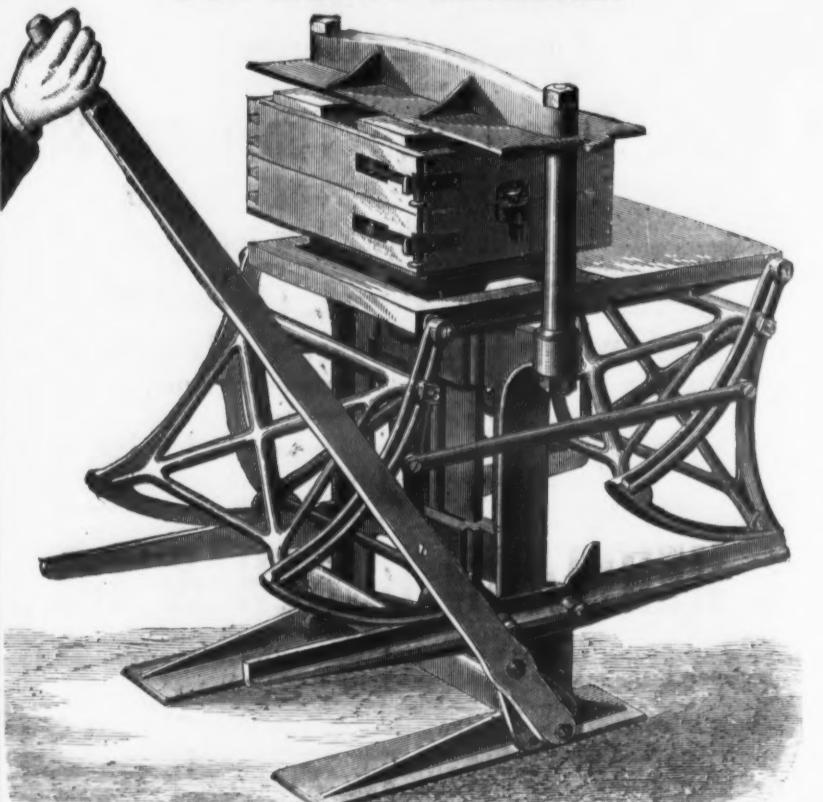
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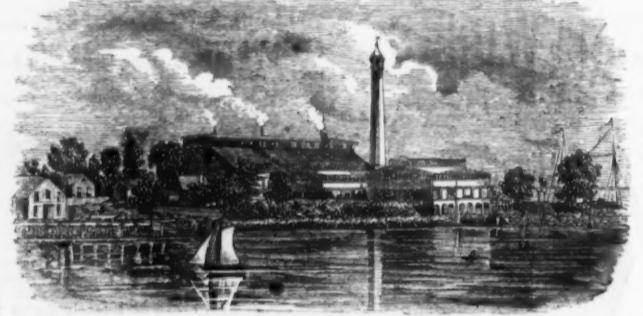
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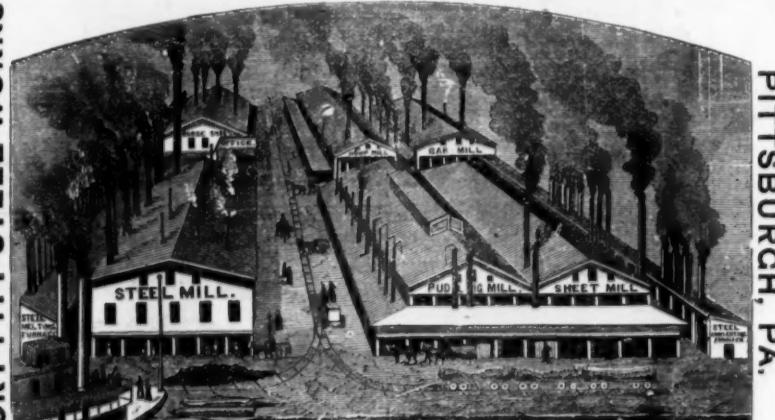
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24/32	21 00	23 00	20 00	2 00	5 25
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34/32	23 00	25 00	22 00	2 50	8 50
41/32	24 00	26 00	23 00	2 75	11 50
47/32	25 00	27 00	24 00	3 25	16 00
53/32	26 00	28 00	25 00	3 50	20 00
59/32	27 00	29 00	26 00	3 75	24 00
65/32	28 00	30 00	27 00	4 25	29 00
71/32	29 00	31 00	28 00	4 50	32 00
81/32	30 00	32 00	29 00	5 00	33 00
91/32	31 00	33 00	30 00	5 50	37 00
102/32	32 00	34 00	31 00	6 00	42 00
116/32	33 00	35 00	32 00	6 50	47 00
132/32	34 00	36 00	33 00	7 00	55 00
150/32	35 00	37 00	34 00	7 50	60 00
169/32	36 00	38 00	35 00	8 00	65 00
199/32	37 00	39 00	36 00	8 50	70 00
230/32	38 00	40 00	37 00	9 00	75 00
255/32	39 00	41 00	38 00	9 50	80 00
9	40 00	42 00	39 00	10 00	..

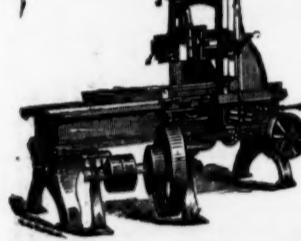
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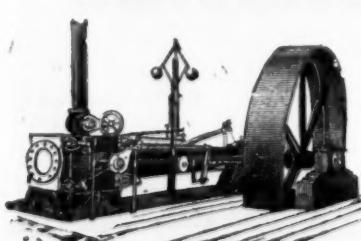
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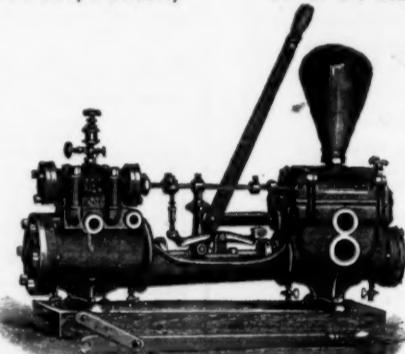
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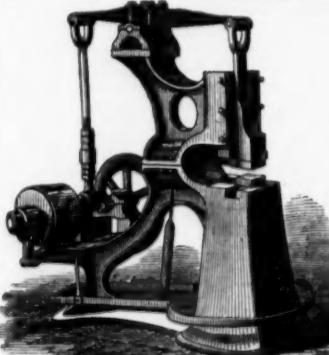


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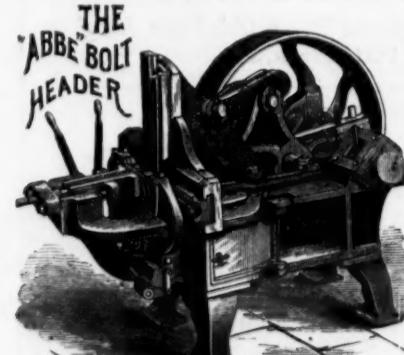
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X Metal Copper Hardening.....	40 cts. per lb.	F	These metals are the ordinary low priced Babbitt alloys, used where there is not much wear on the machinery, and where economy is required.
A " "	35 cts. per lb.	G	These metals are the ordinary low priced Babbitt alloys, used where there is not much wear on the machinery, and where economy is required.
B " "	30 cts. per lb.	H	These metals are the ordinary low priced Babbitt alloys, used where there is not much wear on the machinery, and where economy is required.
C " "	25 cts. per lb.		
BRASS CASTINGS,	21 to 80c per lb.		
INGOT BRASS,	19 to 30c per lb.		
BRASS TURNINGS AND OLD METALS WANTED.			

Plumb, Burdick & Barnard,

BUFFALO, N. Y.

MANUFACTURERS OF

BOLTS

COACH SCREWS,

SKEIN BOLTS,

CARRIAGE BOLTS,

TIRE, SLEIGH SHOE,

Machine and Blank Bolts.

FERNALD & SISE, N. Y. Agents, 100 Chambers St.

ESTABLISHED 1842.

WM. & HARVEY ROWLAND,
PHILADELPHIA,

P. O. Address: Frankford, Phila. MANUFACTURERS OF ALL KINDS OF

Elliptic, Platform and C Springs,
MADE EXCLUSIVELY FROM

SWEDISH STOCK, OIL-TEMPERED and WARRANTED.

Swedish Tire, Toe, Blister and Spring Steel.

CAST SPRING AND PLOW STEEL.

CAST SHOVEL, HOE AND MACHINERY STEEL.

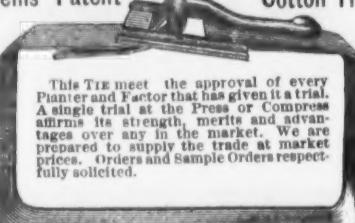
BESSEMER TOE, SLEIGH AND TIRE STEEL.

BESSEMER SHOVEL AND PLOW STEEL.

BESSEMER MACHINERY AND CULTIVATOR STEEL.

RE-ROLLED NORWAY SHAPES.
NORWAY NAIL RODS ROLLED AND SLIT FROM SUPERIOR BRANDS.

SUCCESS
BEYOND COMPETITION.
Nellis' Patent Cotton Tie.



This Tie meets the approval of every Painter and Factor that has given it a trial. A single trial at the Press or Comparison will prove its value and advantages over all in the market. We are prepared to supply the trade at market prices. Orders and Sample Orders respectfully solicited.

Nellis' Process for Tempering Steel,
Which we use in the manufacture of Moldboards, Walking and Riding Culverts, Hoses, Overalls, Fenders, Reversible Points, Cultivator Teeth, Rolling Coulters, Cotton Sweeps, Scrapers, Bill Scrapers, and Vine Cutters, Whiffetree Clips, Steel and Iron Harrow Teeth, &c.; in fact, everything in the agricultural lines which we bevel, temper and strain to suit all kinds of soil. Implement makers and Farmers will find themselves in making selections by the imprint thereon of our Trade Mark.

Also Manufacturers of Nella Original Harpoon Horse Hay Forks, &c. Grappling and Pulleys and Harp's Post Auger. Your wants in our lines will receive prompt attention by addressing

A. J. NELLIS & CO.,
Pittsburgh, Pa.

ESTABLISHED 1840.

R. E. DIETZ,
No. 54 & 56 Fulton, and
29 & 31 Cliff Street, New York,

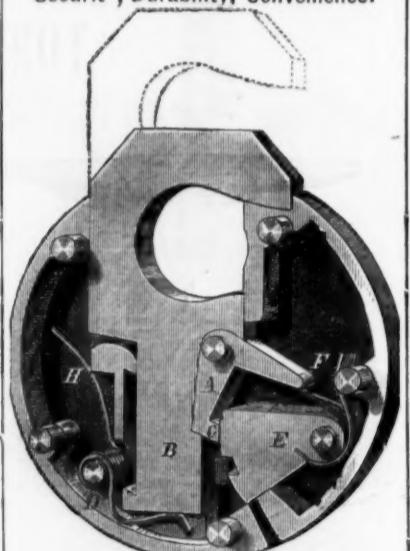
Manufacturer of the



Each mouse caught resets the Trap for another.

TUBULAR
And Other
Patent Lanterns
BRASS AND IRON
Jack Chains.

D. H. MILLER LOCK CO.
712 Cherry St., Philadelphia, Pa.
Securit, Durability, Convenience.



Made in the most substantial and compact manner, and are in every respect a superior article. We guarantee that no two locks are alike, unless specially ordered. Each lock is accompanied by a key, and many numbers of locks or keys made to order. Adopted by the United States Government. Samples of No. 1 Lock sent to all parts free, on receipt of \$1.75. Liberal Discounts to the Trade.

GAS FIXTURES.

Lamps, Bronzes,
Equal to any made, in great variety,
all of our own manufacture.

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21 & 23 Barclay, cor. Church St.,
NEW YORK.

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BROKERS IN

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Pig, Bar, Band, Hoop, Plate,
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William N. Jennings,

FINE PRINTING and STATIONERY

No. 43 Franklin Street,
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NEW YORK.

Established 1827. Oldest House in the Plumbago Trade.

46 Prizes since 1839
for our Black
Lead Manufactures.

DIXON'S Silver Medal
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Plumbago
"PERFECT LUBRICATOR,"

Being Finely Pulverized and absolutely Pure

AMERICAN GRAPHITE.

A Sure Preventive of, and Cure for, Hot Journals or Heated Bearings of any kind.

WILL SAVE WEAR, DELAYS, TIME AND MONEY.

It is not a compound or mixture, but Pure Graphite, of wonderful and unique properties, free from grit, a perfect conductor; not touched by acids, or changed by fire or frost.

Safe, Economical, Indestructible.

Known as the best Lubricator 200 years ago; but nobody has been heretofore prepared to furnish it in a perfectly pure state to the trade.

FIFTY CENTS PER POUND.

The Joseph Dixon Crucible Company,
ORESTES CLEVELAND, President, Jersey City, N. J.
Works and Offices, 233, 235, 237, 239, 241 and 243 RAILROAD AVENUE;
250, 252, 254 and 256 WAYNE STREET.

Russell, Burdsall & Ward,
PORT CHESTER, N. Y.

Manufacturers of

**Carriage, Tire, Plow, Stove,
AND OTHER**

BOLTS.

Carriage Bolts made from Best Square Iron, a Specialty.

THE "GEM" DOOR SPRING,

Made of Best Quality of Steel and of Superior Temper.

An

Made for

Service.

easily

Reliable,

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Satisfactory

and

and

effective

Low in Price.

Spring.

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Manufacture the most reliable

SILVER PLATED SPOONS & FORKS.

They are plated by weight, and not by time or guess, containing 20 per cent. more silver than the usual standard, on a base of Nickel Silver, and finished by hand. Each article is guaranteed by the trade mark and warranted to give full satisfaction. We ask of the trade a fair and impartial test, assuring them that the high standard already attained, shall be maintained. Send for Catalogue and Price.

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Schofield's Pat. Gauge Cock.

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Importers and Dealers in

For Water, Gas and Steam.

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